QUALCOMM Enterprise Services

MCP50

Installation and Troubleshooting Guide

80-JB566-1 Rev. C

September 2012

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80-JB566-1 Rev. C

September 2012

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Safety Definitions

The following Caution and Warning definitions are intended to advise the driver when it is safe to use a display unit.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Safety Advice

The following Safety Advice is provided for drivers, installers, and application developers who use and/or locate all types of display units.

If you are a Driver, do not use a display unit when the vehicle is in motion.

If you are an Installer, do not locate the display unit, including third-party devices, where it obstructs the driver's field of vision, distracts the driver from the driving task, or interferes with the driver's operation of controls or instruments. The following is displayed when ignition is turned on.

Driver Warning
03:11 PM
WARNING
Use of this device must not divert your attention away from the road and traffic. Driving while distracted can lead to a serious accident. Keep your eyes on the road.
Ok

If you are a Third-party Device Manufacturer or Application Developer, it is your responsibility to provide appropriate warnings regarding the safe use of your device(s) in conjunction with Qualcomm equipment. Applications should not require the driver to divert his attention from the road while driving a vehicle.

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1
Component Overview

Components

Antenna

The antenna includes a cellular modem and GPS receiver.

- Dimensions: 4 1/8 x 2 1/8 x 1 1/8 inches
- Weight:6 ounces
- Cable attached for connection to VTM (cellular/GPS leads)
- Cable length: 7 feet

Display Interface Unit 50 (DIU50)

A color graphical display that integrates touchscreen functionality.

- Dimensions: 7 5/8 x 5 1/2 x 1 1/2 inches
- Weight: 1.2 pounds
- Screen size: 7-inch diagonal, resolution: 800 x 480
- Built-in speaker for text-to-speech
- USB 2.0 Host Port
- Cable attached for connection to VTM
- Cable length: 9 1/2 feet

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Vehicle Telematics Module 50 (VTM50)

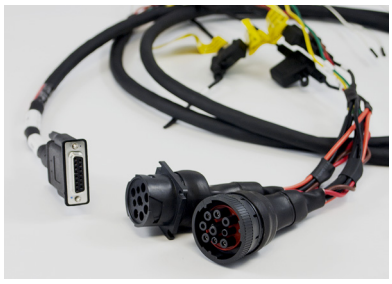
The VTM provides power to the display and processing of vehicle data.

- Dimensions: 6 1/2 x 3 3/4 x 1 1/2 inches
- Weight: 12 ounces
- Supports J1587 and J1939 vehicle data protocols
- Accelerometer

Power/IO Cable (9-pin or 6-pin "Y" cable)

Connects to a truck's 9-pin or 6-pin diagnostic connector for power and vehicle data on J1587 and J1939 data links.

- Cable length: 7 feet



Display Holster

Allows the display to be moved around the cab, or secured on the dash while the truck is operating.

RAM Mount

Used for mounting the display/holster to the dash.

Backing Plate

Always use the supplied backing plate to strengthen the support for the mount.

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Activation

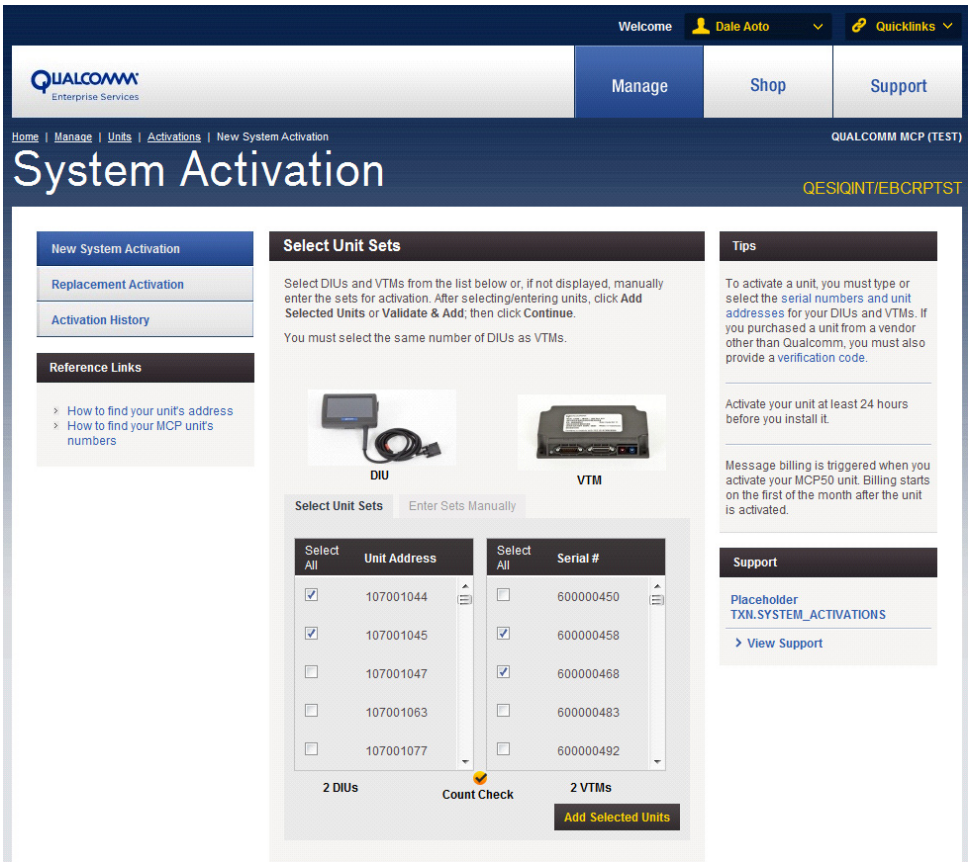
Online Activation

Online activation process should have already been completed at least one day prior to installation. This assigns the unit to the correct customer account and registers it on the cellular network.

MCP50 activation requires access to the Customer Portal. Contractors and Service Centers must work with the customers to activate units.

The online activation process may take up to 1 hour to complete. To perform the online activation:

1. Using your supplied credentials, log into: https://customer.myqualcomm.com.
2. Navigate to **Manage -> Units ->New System Activation**.
3. Select the serial numbers of the DIUs and VTMs that are planned for installation. Ensure that there are an equal number of DIUs and VTMs selected. Click **Add Selected Units**.


Welcome
Dale Aoto
Quicklinks
QUALCOMM Enterprise Services
Manage
Shop
Support
Home | Manage | Units | Activations | New System Activation
QUALCOMM MCP (TEST)
System Activation
QESIQINT/EBCRPTST
New System Activation
Replacement Activation
Activation History
Reference Links
How to find your unit's address
How to find your MCP unit's numbers
Select Unit Sets
Select DIUs and VTMs from the list below or, if not displayed, manually enter the sets for activation. After selecting/entering units, click Add Selected Units or Validate & Add; then click Continue.
You must select the same number of DIUs as VTMs.
DIU
VTM
Select Unit Sets
Enter Sets Manually
Select All
Unit Address
107001044
107001045
107001047
107001063
107001077
Select All
Serial #
600000450
600000458
600000468
600000483
600000492
2 DIUs
Count Check
2 VTMs
Add Selected Units
Tips
To activate a unit, you must type or select the serial numbers and unit addresses for your DIUs and VTMs. If you purchased a unit from a vendor other than Qualcomm, you must also provide a verification code.
Activate your unit at least 24 hours before you install it.
Message billing is triggered when you activate your MCP50 unit. Billing starts on the first of the month after the unit is activated.
Support
Placeholder TXN.SYSTEM_ACTIVATIONS
View Support

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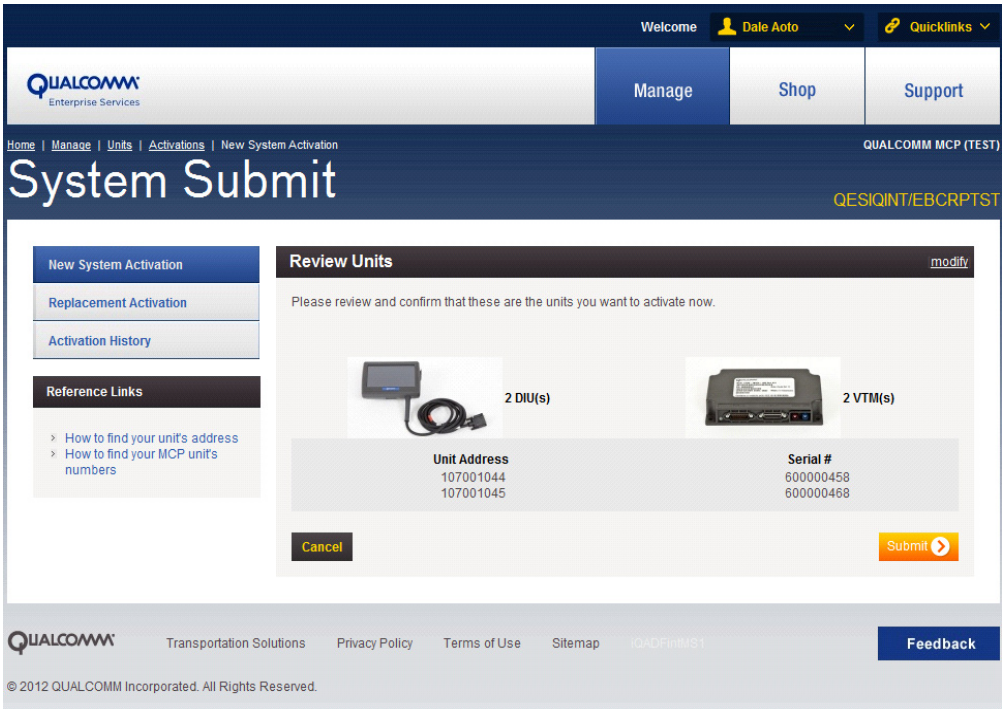
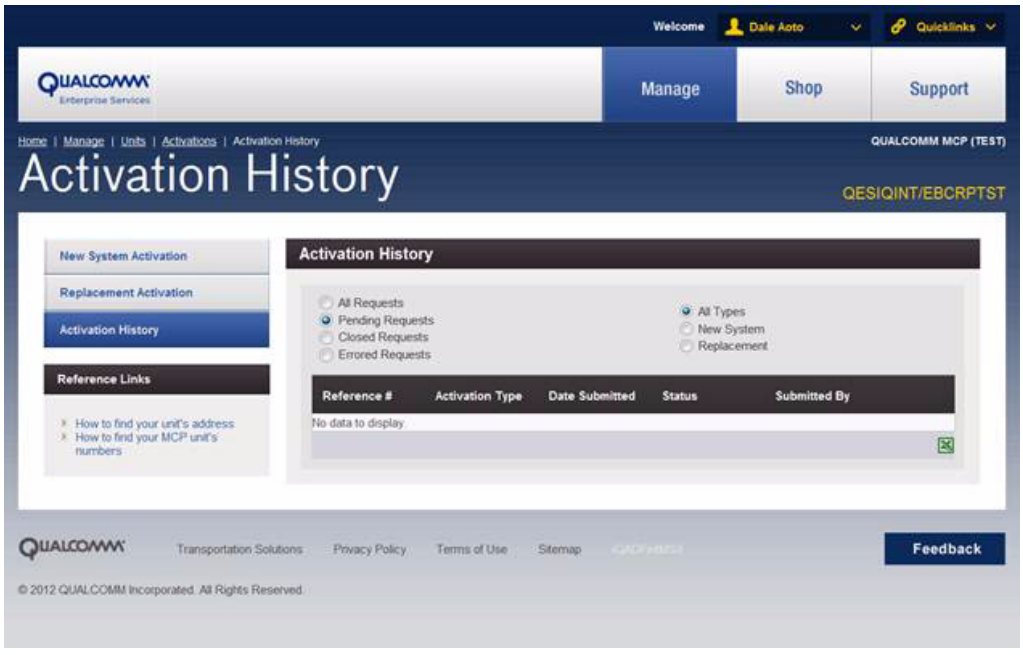
4. Click **Continue**. Click **Submit**.



5. To verify that the unit you are installing is activated, click **Activation History**. Choose what types of activations you want to see.



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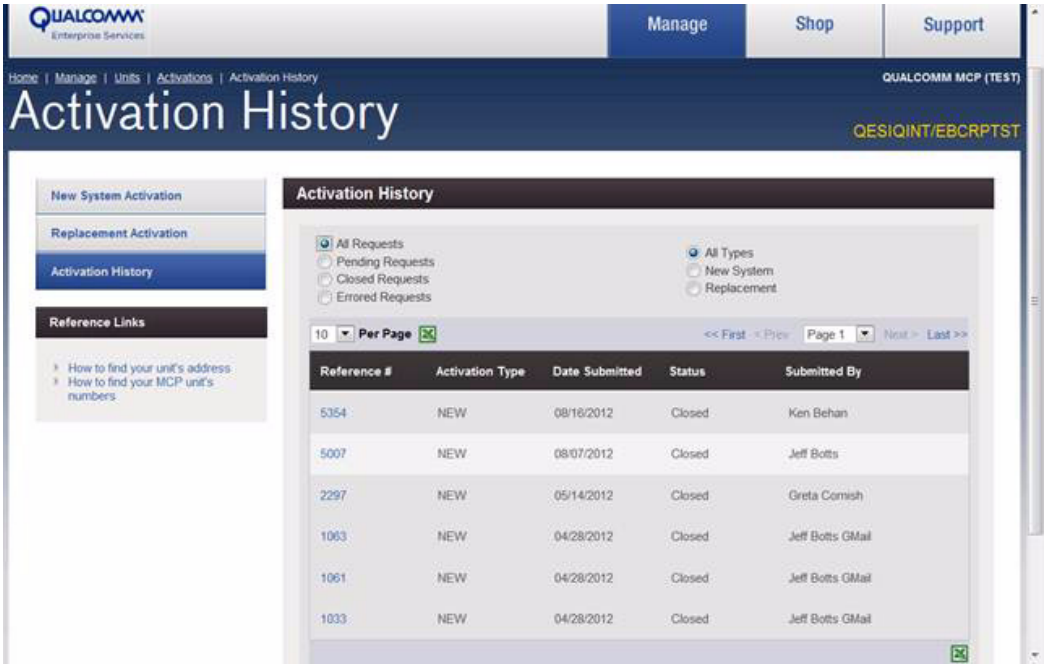
6. You will then see a screen similar to the following.



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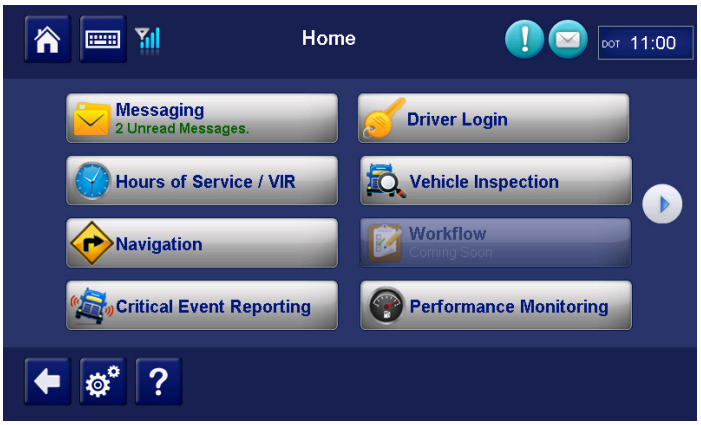
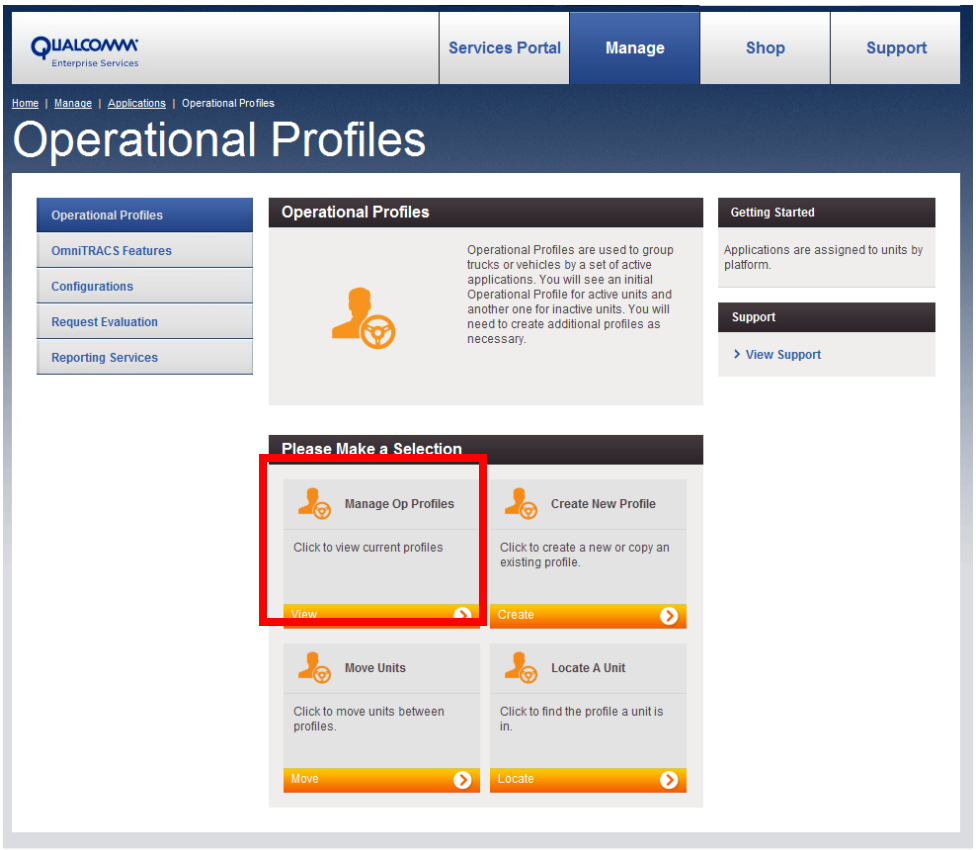
Application Management

The applications that are made available to a unit are assigned by the customer using an Operational Profile. A customer can select which applications a given unit should have. Those applications that are not available will not be selectable at the MCP50 display (grayed out). In the screen below, Workflow is not available.



1. To make changes to operational profile, from the Customer Portal, Navigate to **Manage** -> **Applications** -> **Operational Profiles**.


QUALCOMM Enterprise Services
Services Portal
Manage
Shop
Support
Home | Manage | Applications | Operational Profiles
Operational Profiles
Operational Profiles
OmniTRACS Features
Configurations
Request Evaluation
Reporting Services
Operational Profiles
Operational Profiles are used to group trucks or vehicles by a set of active applications. You will see an initial Operational Profile for active units and another one for inactive units. You will need to create additional profiles as necessary.
Getting Started
Applications are assigned to units by platform.
Support
View Support
Please Make a Selection
Manage Op Profiles
Click to view current profiles
View
Create New Profile
Click to create a new or copy an existing profile.
Create
Move Units
Click to move units between profiles.
Move
Locate A Unit
Click to find the profile a unit is in.
Locate

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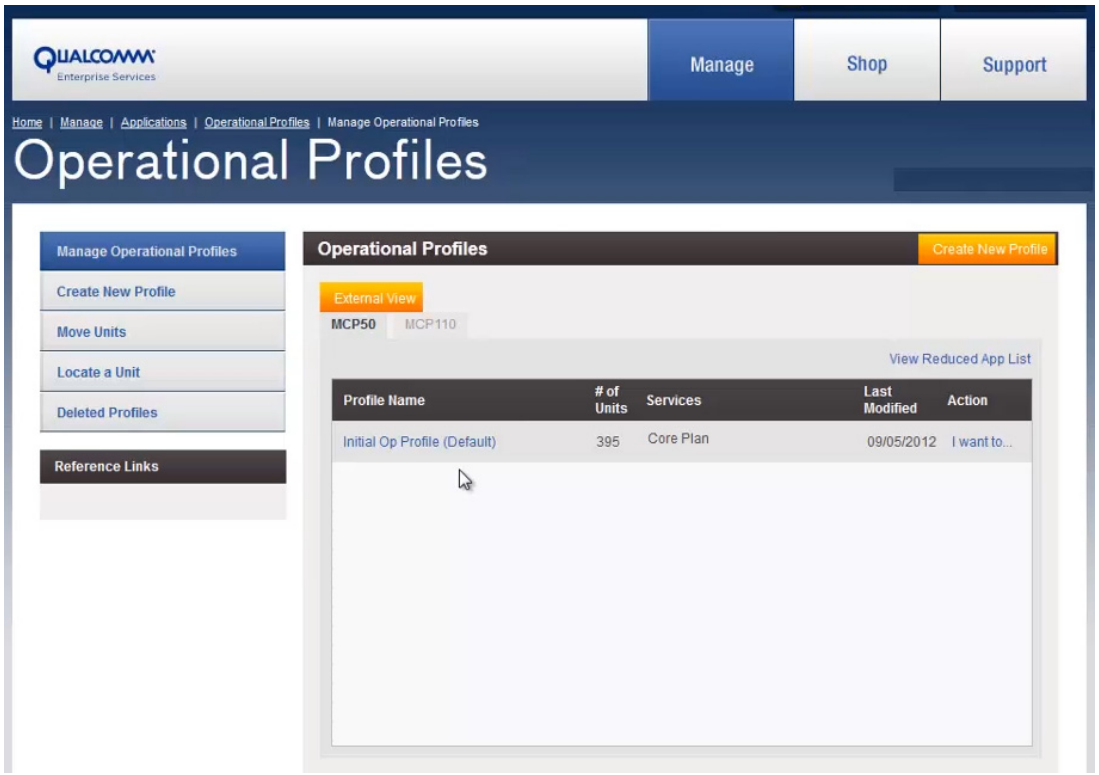
2. Click on **Manage Op Profile**.



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3
Installation Planning

Regulatory Compliance Information

FCC/IC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le onctionnement.

Caution

This equipment should be installed and operated with minimum 20 cm between the radiator and body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC/IC.

Installation Guidelines

Typical Installation Steps

1. Online Activation (at least one day prior)
2. VTM50 Installation
3. Antenna Installation
4. Display (DIU50) Installation
5. Power/IO and ignition connection

   Note

   It is recommended to have all components connected to the VTM before applying power via the Power I/O cable.

6. System verification

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Safety, Reliability, and Accessibility

- Use eye protection when using a drill/performing work that may be hazardous to the eyes.
- Use ear protection in noisy work areas.
- Wear appropriate clothing/uniforms and safety shoes.
- Maintain three points of contact when climbing in and out of cab.
- Make sure you know what is behind the area before you drill.
- Install equipment so it will not cause damage to the vehicle or work loose over time.
- Make sure there are no loose components/cables and no unsecured components.
- Use solid mounting surfaces.
- Route all cables away from hot or abrasive areas.
- Choose installation locations where components can be easily serviced.
- Choose installation locations where components are safe from tampering and damage.

Tools and Supplies Recommended for Installation

- Crimpers
- Diagonal Wire Cutters
- Wire Strippers
- Screwdrivers: Phillips #2 and Slotted
- Torx Drivers: #20 and #25
- Volt/ohm Meter
- Flush Cutters
- Flash/Drop Light

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4
Vehicle Telematics Module 50 (VTM50) Installation

Installing the VTM50

Caution

The VTM50 must be secured to prevent movement. Movement will affect operation.

Location and Orientation

- Install the VTM within the truck's dash
- It is essential that the VTM is securely mounted to a solid surface. The accelerometer inside the VTM will not work properly if it's not secured.
- If Dual Lock tape is used, verify the mounting surface will allow the Dual Lock tape to fully adhere. The surface needs to be smooth.
- Choose a location where the VTM50 will not come into contact with liquids or solvents.
- Choose a location that provides for the various cable lengths.

  The Power/IO cable must reach from the VTM to the truck's Diagnostic Connector. This cable is 7 feet long.

Examples:

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Securing the VTM50

Use provided Dual Lock tape or self-drilling screws to mount and secure the VTM to a solid surface within the dash.

Using Dual Lock Tape (Used for most installations)

1. Separate the two sides of the Dual Lock tape.
2. Clean the back of the VTM with the provided alcohol wipe and let dry. Once dried, adhere one side of the Dual Lock tape. Apply firm pressure to set the tape.
3. Clean the mounting surface thoroughly, let dry, and then adhere the other side of the Dual Lock tape. Apply firm pressure to set the tape.
4. Attach the VTM to the mounting location ensuring the locking hooks of the tape are fully mated.

   If the VTM will need to be moved to connect cables, be careful not to disturb the adhesive side of the tape. Another option is to not press the locking hooks together until after all the cable connectors have been attached to the VTM.

   After application, the bond strength will increase as adhesive flows onto the surface. At room temperature, approximately 50% of the ultimate strength will be achieved after 20 minutes.

   When applied properly and had time to set, the VTM can be removed and reconnected using the tape's locking hooks while the tape remains adhered to the VTM and the mounting surface.

Using Self-Drilling Screws

1. Verify there is not anything behind the mounting surface that may be damaged.
2. Two self-drilling screws are typically used to mount the VTM. Apply the screws through the VTM's eyelets at opposite diagonal corners.

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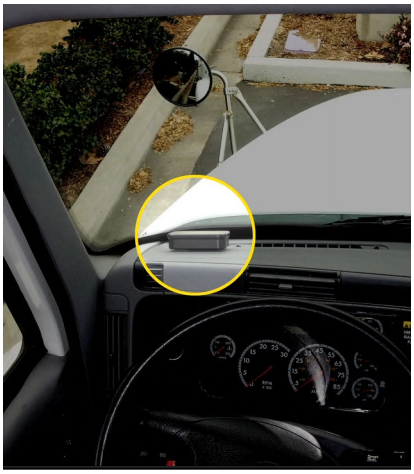
5
Antenna Installation

The antenna must be installed horizontally/flat in the dash or on top of the dash. It must be oriented as shown below. There is a label on the side of the antenna that indicates which side of the antenna is the top. Install as high up in the dash as possible.

In dash



On top of dash with Customer Approval only

IMPORTANT: Ensure that

- No metal objects will be placed above the antenna.
- Antenna must be oriented with the arrow facing up.
- For installs on new truck types, test signal strengths and GPS prior to securing the antenna and replacing dash panels.

For optimal system performance, the antenna may be placed on top of the vehicle's dash and as close to the windshield as possible. This will expose the antenna to possible tampering, so customer approval must be obtained. There are many vehicles that mounting in the dash is an acceptable practice. Use the GPS tab and following guidelines as a rule of thumb when selecting an acceptable antenna location:

- Precision: should be a value equal to 2 or less
- Satellites: should show a value of 5 or more (***Note****: it is the first value shown*)

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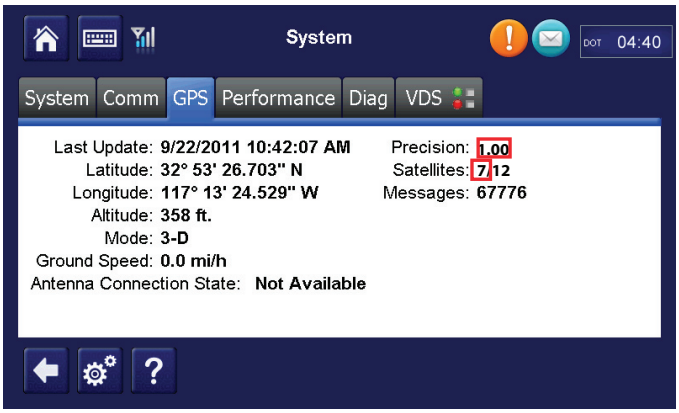
GPS Screen



Installing Antenna

1. Separate the two sides of the supplied Dual Lock tape.
2. Clean the surface of the antenna where the Dual Lock tape will be applied with the provided alcohol wipe. Once the surface is dry, adhere one side of the Dual Lock tape. Apply firm pressure to the tape. The preferred method is to attach the dual lock tape to the bottom of the antenna wherever possible.
3. Clean the mounting surface in the truck thoroughly, let dry, and then adhere the other side of the Dual Lock tape. Apply firm pressure to set the tape.
4. Attach the antenna to the mounting location. Ensure the locking hooks of the tape are fully mated.
5. Route the antenna cable leads to the VTM and carefully mate the two connectors to the VTM “Comm” and “GPS” slots. Be sure the wire leads are not kinked when routing and the connectors are not bent or bumped in later steps when connecting other cables to the VTM.

   The connectors are color-coded and keyed to prevent mismating. There is a push down tab at the top of each connector to remove the connector.

6. Secure excess cable so that it does not rub on any sharp edges or is routed over heat sources in the dash. Be sure the cable will not be pinched when dash panels are replaced.

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6
Display Interface Unit 50 (DIU50) Installation

Selecting a Mounting Location

IMPORTANT SAFETY INFORMATION

WARNING

Do not locate the display unit where it obstructs the driver's field of vision, distracts the driver from the driving task, interferes with the driver's operation of controls or displays, or creates a safety hazard. Follow all laws and regulations governing the placement of equipment and mounts.

DO locate the Display where:

- it can be safely installed on a secured bracket that is robust enough to minimize any vibration and sustain the weight of the Display.
- the mounting surface is strong enough to support the mounting hardware.
- the mounting surface is flat.
- it is in the driver's line-of-sight, easy to touch, but does not block the view of the road or mirrors.
- the surrounding area is clear of dash controls and gauges.
- it is not mounted in constant, direct sunlight.
- it does not limit a passenger's leg room or block access to any other compartments.
- it does not interfere with anyone entering or exiting the vehicle cab.
- it is not likely to impact the driver or passenger in case of an accident or collision.

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DO NOT locate the Display where it:

- obstructs the driver's field of vision.
- distracts the driver from the driving task.
- interferes with the driver's operation of controls or shifting.
- obstructs the area swept by the windshield wipers.
- blocks the deployment of an airbag.

Additional information for selecting an installation location:

- Installations should not obstruct the driver's field of vision while operating the vehicle, and should comply with all applicable federal and state laws and regulations regarding appropriate installation locations (including restrictions against the mounting of objects on a vehicle's windshield) and driver distraction.
- Consider the owner's preference in selecting the installation location and whether there is a team or a single driver.

Installing the Display

Included with the MCP50 system is RAM mounting hardware. Always use the supplied backing plate to strengthen the support for the mount.

1. Once a suitable location is selected, verify that there is nothing behind the mounting surface that might be damaged by drilling holes.

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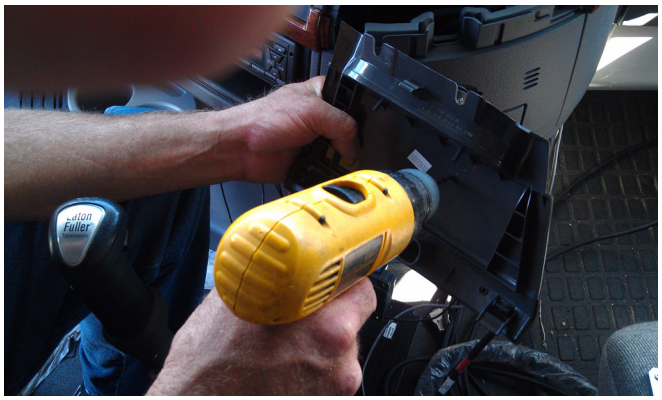
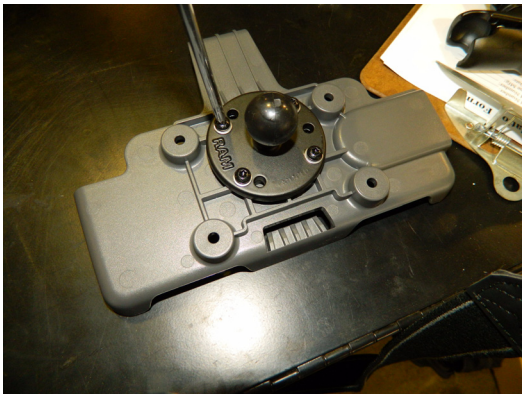
2. Drill 3/16" holes for the mounting bracket and backing plate using the backing plate as a template.



3. Attach the RAM mount ball joint to the dash using the supplied 8x32 screws, lock washers, and backing plate. This hardware is included with the RAM mount kit.

4. Attach the other RAM mount ball-joint to the holster using supplied screws and lock washers. The supplied screws are 1/2" long. DO NOT use screws that are too long or they will protrude through the holster.



5. Join the holster-side ball joint to the dash-side ball joint using the RAM mount arm. Loosen the arm lever and adjust the holster to the desired position and then tighten the arm lever to secure assembly into place. Be sure the arm is loosened prior to making adjustments and then retightened to secure in place.

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6. Snap the display into the holster by placing the bottom into the lower holster tabs and then push the top into the upper holster tab. It will snap into place.

7. Route and connect the display cable to the VTM.

8. Allow just enough display cable slack so the DIU50 can reach the driver steering wheel only. Ensure any excess cable is secured and does not interfere with the operation of the vehicle. Cable should not drape on the floor or cause a tripping hazard.

9. Add a tiewrap strain relief to the DIU cable where it comes out from under or behind the dash so it can't be pulled out further.

WARNING

Excess cable can be a tripping hazard. Ensure cable is not draped where it will interfere with either the driver or passenger as they move within the cab.

Caution

Never connect the MCP50 display cable and the power cable directly to each other. Only connect these cables to the MCP50 VTM.

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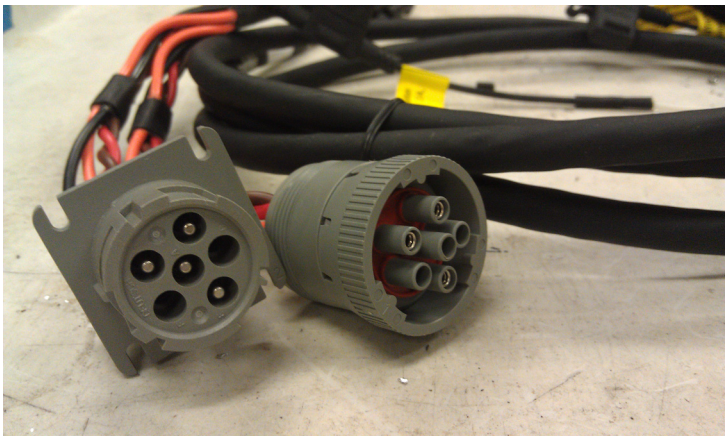
7
Power/IO Cable Connection



The Power/IO cable is used to connect to a truck's Diagnostic Connector. It provides both power and the necessary vehicle data for the MCP50 system. There are two masterpacks: one with 9-pin Power/IO diagnostic connector and the other with 6-pin diagnostic connector.

A separate lead is on the Power/IO Cable designated for ignition. This lead will need to be connected to a 12VDC ignition switched power source.

The appropriate 6-pin or 9-pin Power/IO masterpack should have been ordered for your installation. If the Power/IO Cable connector does not mate to the truck's diagnostic connector, the Y portion of the Power/IO Cable will need to be cut off and wires will need to be crimp spliced. See Chapter C: General Wiring and Installation Guidelines for instructions.

Connecting the Power/IO Cable

1. With the truck's ignition OFF, remove and push back existing truck diagnostic connector. Check connector to verify it's clean of debris and there are no bent pins.

2. Connect the Power/IO cable connector to the truck's diagnostic connector. Verify the outer ring is twisted and clicks into place so the ends do not become unconnected by accident. Verify by pull testing the connector.

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Caution

Never connect the MCP50 display cable and the power cable directly to each other. Only connect these cables to the MCP50 VTM.

3. Connect the ignition wire to a 12 VDC ignition switched source. If you need to add wire length to the ignition wire to get it to the source, see *Extending MCP50 Ignition Wire*.
4. Put the unused Power/IO cable end where the truck's diagnostic connector was located.

Note

On newer Paccar trucks (Kenworth and Peterbilt), it may be required to purchase a Paccar adapter cable from Qualcomm. See Appendix G for more information.

5. Connect the DB15 end of the Power/IO cable to the VTM50.
6. Secure any excess cable using tie-wraps.

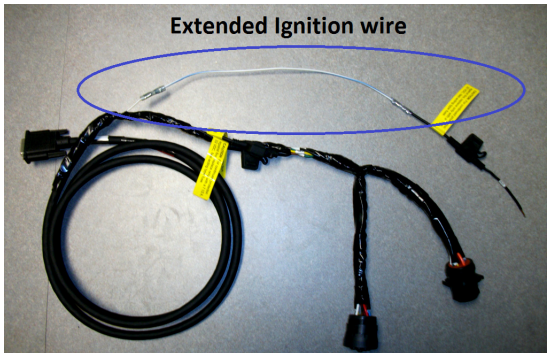
Extending MCP50 Ignition Wire

Recommended Tools and Supplies:

- White 18ga stranded wire
- 16ga Butt Splices (blue) qty2
- Wire Strippers/Cutters
- Butt Splice Crimping Tool

The MCP50 Power/IO cable has an Ignition wire separate from the diagnostic connector.

1. Cut and remove the in-line fuse from the white Ignition wire of the Power/IO cable. Be sure to leave enough wire on the fuse to reattach it at the end of the extension wire.
2. Butt Splice the extension wire to the Power/IO Ignition wire.
3. Butt Splice the fuse wire to the opposite end of the extension wire.
4. Connect the fused end to the ignition source. (12 VDC ignition switched source)



WARNING

Stow and secure any excess cable behind the dash panel.

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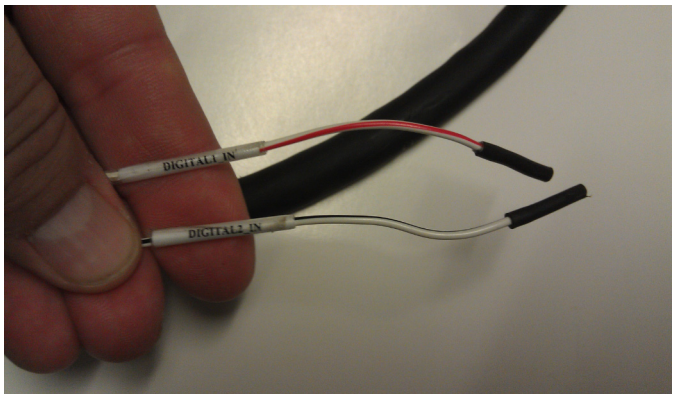
8
Optional Accessories

PTO (Power Take-off) Overview - optional connection

This option provides customers with the ability to log the time the vehicle engine is used for operational idle purposes, such as when it is powering auxiliary devices using a pump or compressor.

In order to log PTO time, the installation involves connecting one of the two PTO wires.



The loose white/red wire labeled Digital1_IN, in the Power/IO cable is the PTO wire.

The MCP50 system detects an active PTO device when it sees 12 volts (active high). A switch that goes active to ground will require a relay.

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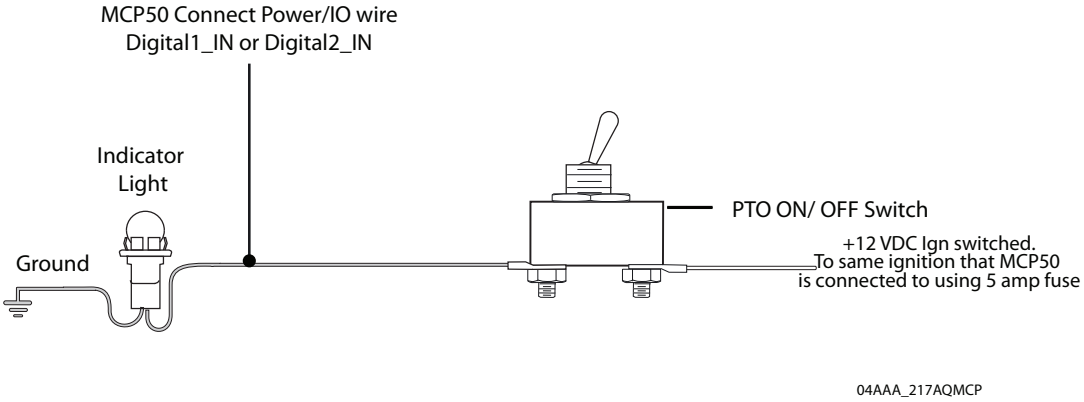
PTO Installation

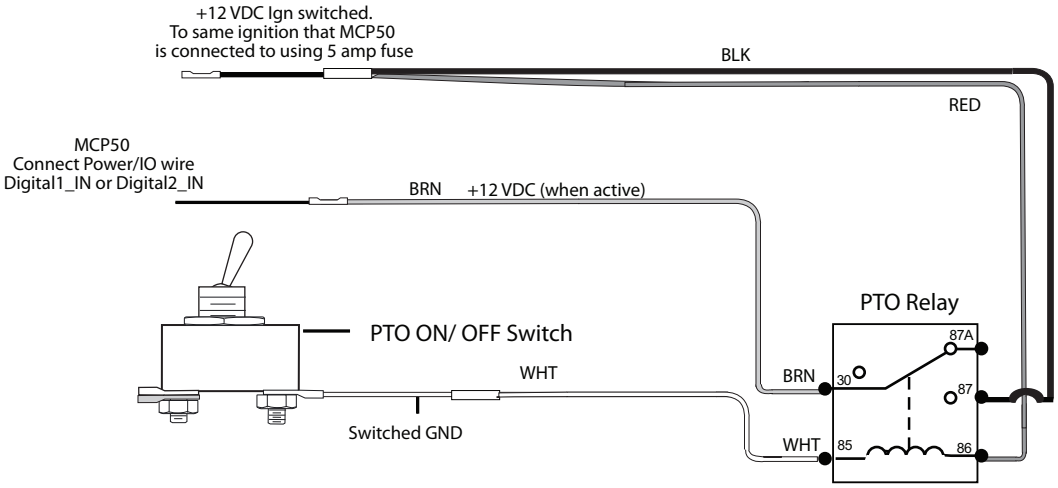
Use a multi-meter to determine which type of PTO circuit you are connecting to when engaging the PTO switch.

Wiring to Switched +12VDC Circuit



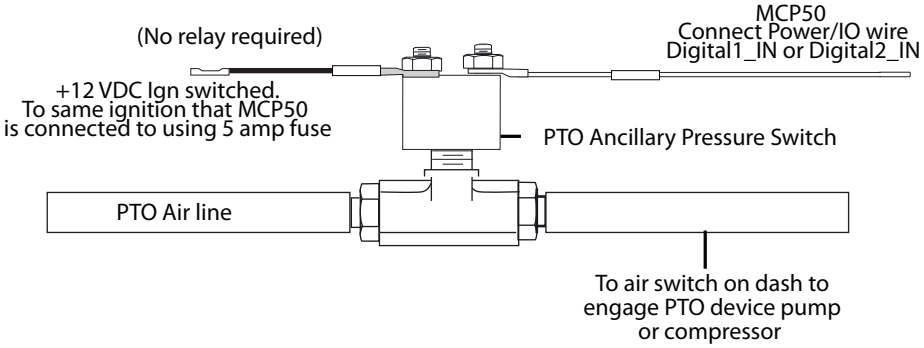
Wiring to Switched Ground Circuit

If you have a switched circuit that is activated to the ground to detect PTO time, a relay must be used.



Wiring to an Air Pressure Switch for Air-activated PTO

If the air pressure switch is not wired to 12 VDC, make sure to remove the ground wire and attach a fused wire from the MCP50 ignition source.



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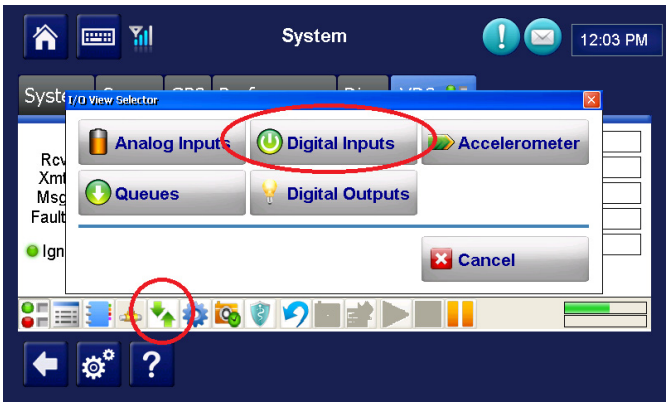
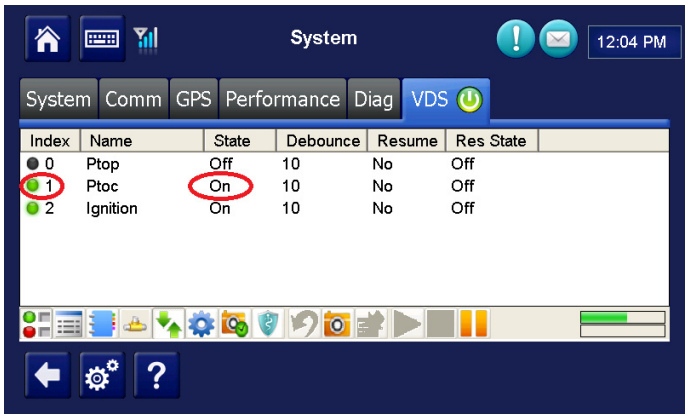
PTO Data Input Verification Procedure

1. Start the vehicle.
2. Turn the PTO switch **ON.**
3. Navigate to the **System VDS** screen.
4. Tap the green up and down arrow button at bottom of the screen (circled below).



5. Verify either PTOP or PTOC has a green dot under the Index column and shows “On” under the State column.



If neither PTOP or PTOC is showing a green dot or “On,” check the PTO wire connections.

6. Turn off PTO device. The green dot and State will change (i.e., to a black dot and “Off.”)
7. At this point, the PTO wire installation verification is complete.
8. Verify through the Performance Monitoring screens that the PTO application is recording correctly.
9. Start the vehicle.

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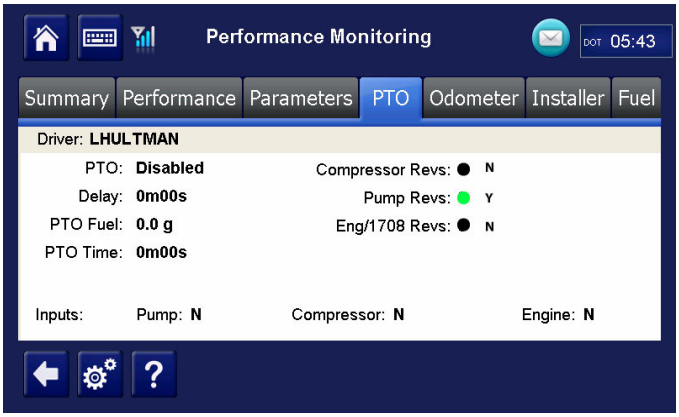
10. Turn the PTO device ON.

11. Navigate to the PTO screen. Tap the **Performance Monitoring** button the tap **PTO** tab.



Note

If the performance monitoring button is grayed out, Performance Monitoring is not enabled. Call your company dispatch to have this application enabled. Performance Monitoring parameters must be sent to the unit as well.

12. Verify that PTO is Enabled and the Compressor or Pump displays a **Y** according to what is active.

13. You should see the green indicator light according to what is active.

14. Check that the PTO Time field is incrementing. Is this field incrementing?

Note

In order for PTO time to be recorded in Performance Monitoring, RPM must be >0, speed <20 mph, and the PTO time delay (customer configured) must be reached.

- If yes, PTO verification is complete.
- If no, check the wire connections.

15. Turn off PTO device. PTO time should now stop incrementing.

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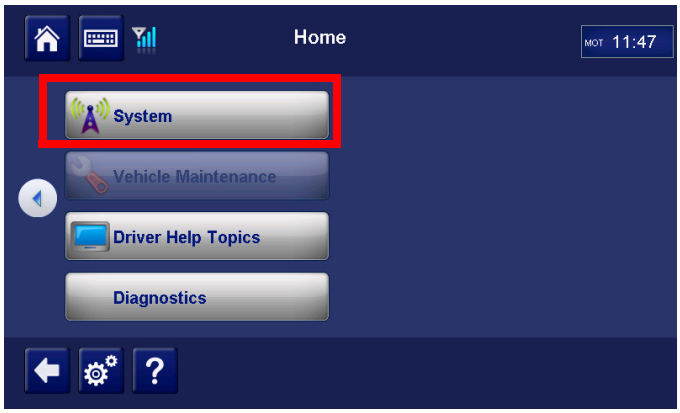
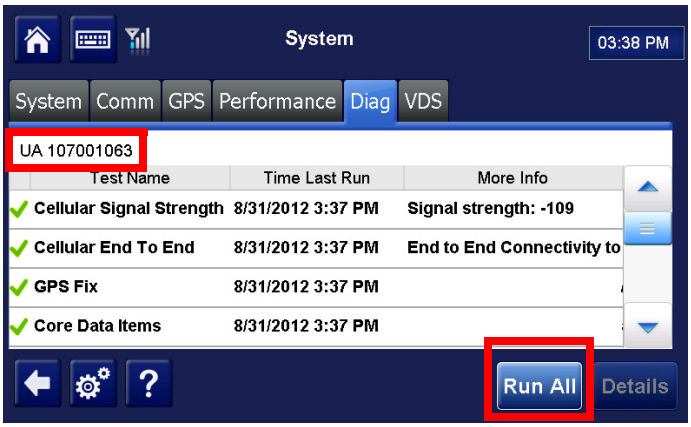
Performing System Verification

Shortly after you power up the MCP50, the Driver Warning screen appears. After tapping the **OK** button, the MCP50 Home screen displays.

1. Tap the arrow on the right until you see the System button, then tap the **System** button.



2. Tap the **Diag** tab. ***Note:*** *the MCP50 Unit Address (UA) shows at the top.*



3. Tap the **Run All** button, located at the bottom right of the screen. The system runs tests on all listed items then displays the results.

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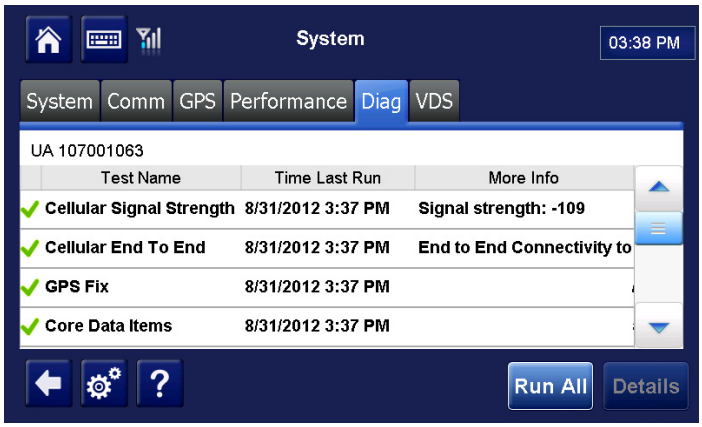

First page of tests

If the test passes, a (green ✓) is shown. If the test fails, a (red **X**) is shown.

Cellular Signal Strength, Cellular End to End, GPS, and Core Data Items should have a green checkmark.

Item	*Description*
Cellular Signal Strength	Will show a green checkmark when in good cellular network coverage. See *Chapter 15: Cellular Signal Strength Problems* if red X.
Cellular End To End	Will show a green checkmark if the unit is successfully transmitting with Qualcomm and received an acknowledgement back. See *Chapter 14: Cellular End to End Problems* if red X.
GPS fix test	Will show a green checkmark if GPS network is detected and it is getting a 3D fix. See *Chapter 17: GPS Fix Problem* if red X.
Core Data Items	Will show a green checkmark if Speed, RPM, Distance LTD, and Fuel LTD, and Engine Time is being detected. See *Chapter 21: Core Data Problem* if red X.

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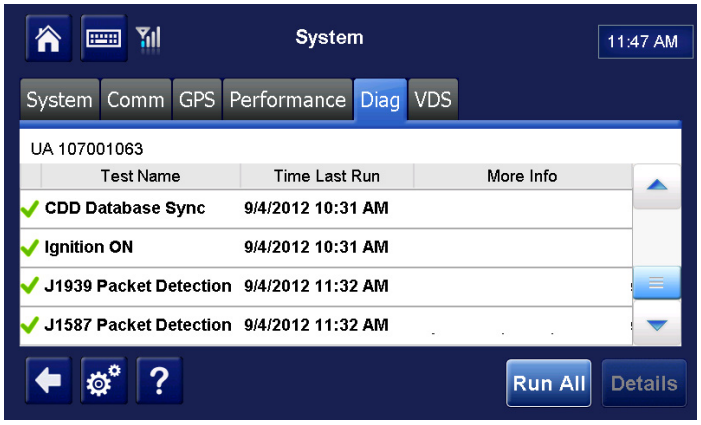

Second page of tests

Use scroll bar to see all results.

CDD and Ignition On should have a green checkmark.

CDD Database Sync	Will show a green checkmark when database has been synchronized with NOC (usually takes 5 to 10 minutes after unit is first powered up). See *Chapter 16: CDD Database Sync Problem* if red X.
Ignition On	Will show a green checkmark if the ignition is ON. See *Chapter 20: Ignition On Detection Problem* if red X.
J1939 Packet Detection	Will show a green checkmark if connected to the J1939 databus, the vehicle's ignition is ON, configured to look for J1939, and its getting data. All vehicles do not have J1939. See *Chapter 19: J1939 Packet Detection Problem* if red X.
J1587 Packet Detection	Will show a green checkmark if connected to the J1587 databus, the vehicle's ignition is ON, configured to look for J1587, and its getting data. All vehicles do not have J1587. See *Chapter 18: J1587 Packet Detection Problem* if red X.

If the results of the Run All Tests are acceptable, send a message from the unit and verify the message is received by dispatch. Once that is confirmed, have dispatch send a message and confirm the message is received. If installation is done after hours, call Customer Support to verify the message is sent and received. **Once this is done, System Verification is complete.**

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Troubleshooting Contents

10. Troubleshooting Best Practices
11. Display Screen is Dark or Blank
12. DIU Problems
13. Cannot Send Messages
14. Cellular End To End Problems
15. Cellular Signal Strength Problems
16. CDD Database Sync Problem
17. GPS Fix Problem
18. J1587 Packet Detection Problem
19. J1939 Packet Detection Problem
20. Ignition On Detection Problem
21. Core Data Problem
22. VTM LED Indicator
23. Acquiring Network Problem
24. Performance Monitoring Troubleshooting
25. Critical Event Reporting Troubleshooting
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10
Troubleshooting Best Practices

Troubleshooting Guidelines

Keep Known Good MCP50 Component Spares in Shop

Spare parts should include:

- Vehicle Telematics Module (VTM50)
- Antenna
- Display Interface Unit (DIU50)
- Power/IO cable

Use a Test Cart to Perform Bad Part Verification/Double Checking

If a Qualcomm MCP50 part is diagnosed bad on a truck, insert the failed part on the test cart.

- If it continues to fail, part should be RMAd.
- If the suspect part does not fail on the test cart, further troubleshooting of the MCP50 will be necessary.

Perform a Visual Inspection of the Installed MCP50

- Check for damaged cables, improper electrical connections, loose connections, and the integrity of the installation, particularly the antenna.
- Bad mounts can contribute to system problems.
- Loose connections or parts not installed properly can allow excessive vibration which can affect system performance.

Reseat All Cables

- Always inspect and reseat cable connectors prior to replacing any components.
- Inspect for corrosion and bent, broken, pushed, missing pins, and/or sockets.

Verify VTM50 LED Indicator Is in a Normal State

- When booting up, the Red LED should blink slowly at first then more quickly.
- Once boot up is completed, the Red LED should be off.
- During normal operations, the Red LED should be off.
- See section Chapter 22: VTM LED Indicator for more information.

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Check System Voltage Measurements and Grounding

Use the same ground reference that the particular circuit uses.

- Check the VTM50 LED.
- Verify that vehicle battery and cables are in good condition.
- Check voltages (see Appendix A for more information):

Replace Only Faulty Parts

Typically, only one part is bad. Once the system is operating, you can substitute suspect parts back into the system to verify which part is bad, or use a test cart equipped with known good spare parts to retest suspect parts.

Determine If the Problem Is Intermittent

Check for bad or loose electrical connections including cable connectors, ring terminals, butt splices, and power/ground connections. These can contribute to intermittent system performance.

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11
Display Screen is Dark or Blank

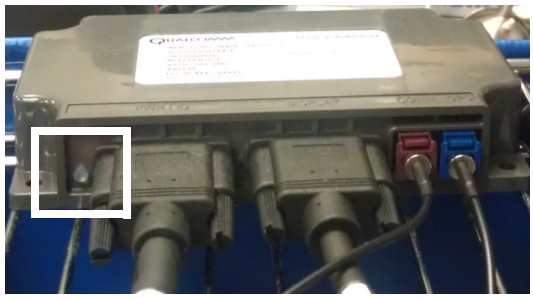
Problem: Display Screen is Dark or Blank

If the display is blank or dark it could be:

- Unit is asleep (i.e. ignition off, and power down timer exceeded)
- Power source or Power/IO cable problem
- Ignition source or ignition wire problem
- Display cable is disconnected from VTM
- Faulty DIU

Turn the vehicle ignition ON.

1. Check to see if the LED on the VTM50 is blinking red as unit boots up.
   - If it is not blinking, reseat the Power/IO connection at the VTM. If the LED is still not blinking, use a digital volt meter to check for power and ignition at the truck's diagnostic connector. Pin-outs for the 6-pin and 9-pin connectors are in the *Appendix A: Wiring Diagrams and Charts*
   - Verify, using a digital volt meter, that the ignition circuit, fuse, and source are functioning properly. 12 VDC should be detected when the truck's ignition key is in the ON position.



2. If there is still a problem, remove power from VTM, reseat the display cable connector at the VTM, and then reapply power to the VTM.

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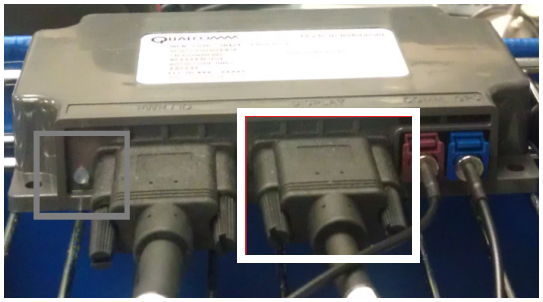
3. If there is still a problem, remove power from the VTM, install a replacement DIU50 display, reapply power to the VTM, and recheck.



Problem: Display Immediately goes Blank when Ignition is Turned Off

When vehicle ignition is turned OFF, the display should stay on for the period of time that has been configured by dispatch. This is the power down time. If the display screen immediately blanks out when the ignition is turned OFF, this could be caused by:

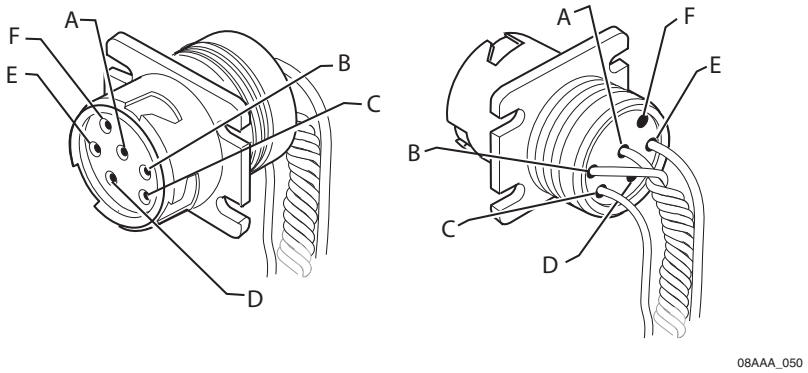
- The MCP50's power-down time or total time is set to zero.
  - Check the host software configuration.
  - The power-down time should not be set below five minutes.
- Make sure primary power is constant not switched.

  Verify diagnostic connector power is ON with ignition On or Off. It cannot be a switched circuit. Measure 12V constant power with ignition off. If it is not, find an alternate constant power source.

For 6-pin diagnostic connectors:

(-) lead on Pin E

(+) lead on Pin C



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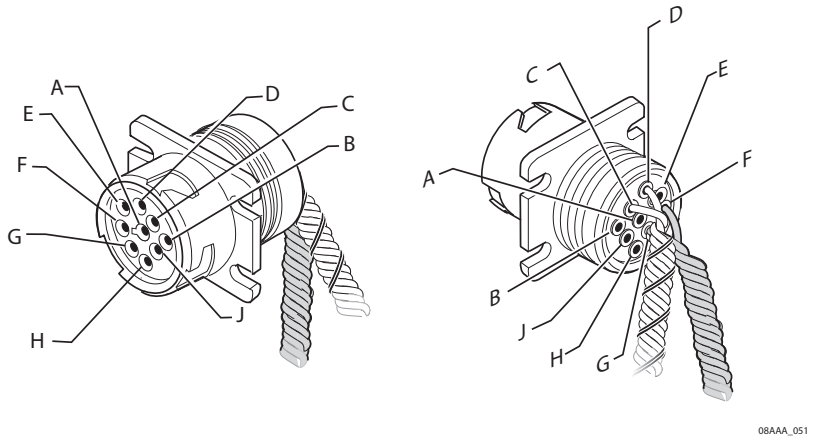
For 9-pin diagnostic connectors:

(-) lead on Pin A

(+) lead on Pin B



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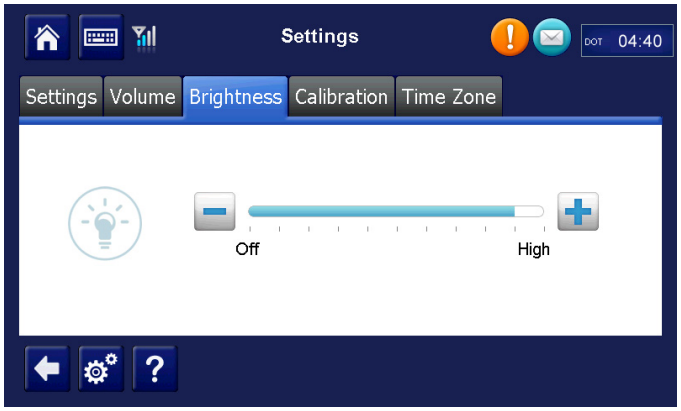
12
DIU Problems

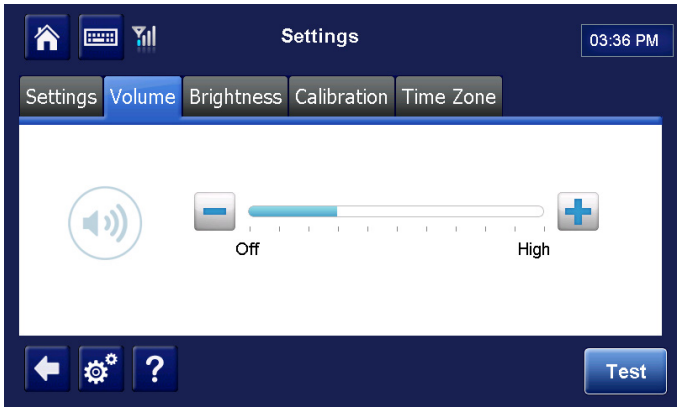
DIU50 Overview

The DIU50 is a color graphic display that integrates touchscreen functionality.

- When the vehicle ignition is ON, an image appears on the display screen.
- To adjust the brightness, tap the **Settings** button and then tap **Brightness**. Tap the **+** (plus) or **-** (minus) buttons to adjust.



- Text-to-speech is played through the unit. To adjust the volume, tap the **Settings** button then tap **Volume**. Tap the **+** (plus) or **-** (minus) buttons to adjust. Tap the **Test** button to play back a message in the volume level chosen.



- When the vehicle ignition is turned OFF, the display screen stays on until the MCP50 power-down timer expires then it goes dark. The power-down timer is configured by the customers' dispatch system.

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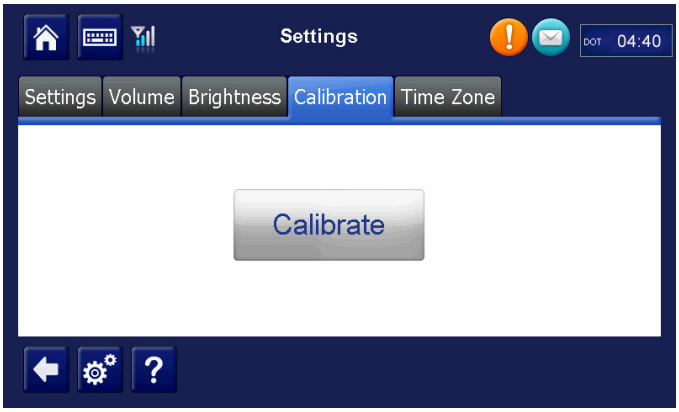
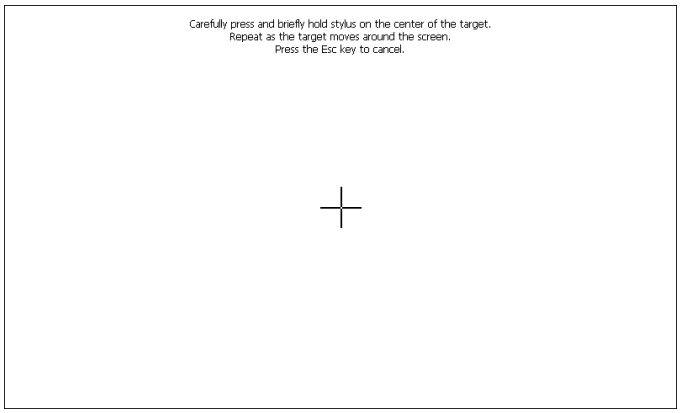
Problem: Touchscreen Non-responsive/Calibration

If you are tapping anywhere on the touchscreen and the screen is not responding quickly or the screen arrow is not where the screen was touched, the touchscreen may not be calibrated properly. To recalibrate the DIU50 touchscreen settings, from the Home screen:

1. Tap the Settings button then tap the **Calibration** tab.
2. Tap the **Calibrate** button.
3. When the targets display, carefully tap and hold down each of the **targets (+)** in the center and release when instructed. It is best to use your finger to calibrate.
4. When the last target is touched, the calibration is complete.
5. If the touchscreen does not allow you to get to the calibration screen, a USB mouse can be connected to use as a pointer. Once you get to the targets, use your finger to tap the screen.




Carefully press and briefly hold stylus on the center of the target.
Repeat as the target moves around the screen.
Press the Esc key to cancel.

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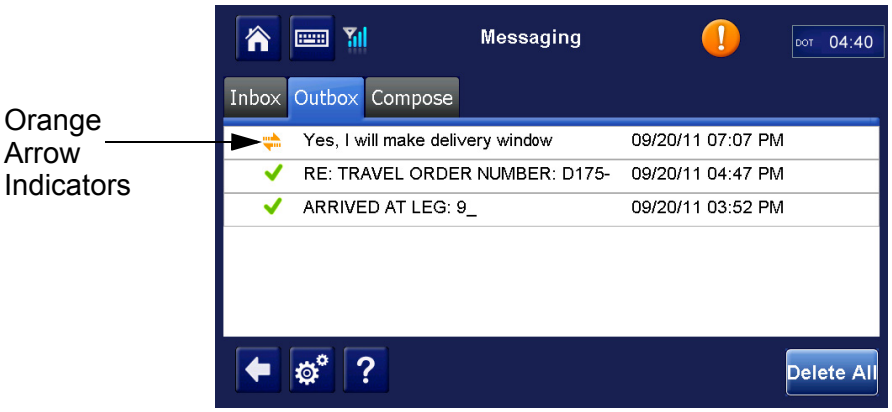
13
Cannot Send Messages

Problem: Cannot Send Messages



If a message have been queued and shows up in the Messaging Outbox with orange arrow indicators for more than a minute, do the following:

1. Verify the Cellular End To End test under the System Diag Run All test passes. See Chapter 14: Cellular End to End Problems.
2. Verify the Cellular Signal Strength indicator shows the unit has acceptable signal. See Chapter 15: Cellular Signal Strength Problems.
3. If both the Cellular End To End and Cellular Signal Strength are good:

   Reset the power to the unit by disconnecting the Power/IO cable at the VTM. Leave it disconnected for a few minutes before reconnecting. After power has been reapplied, give the unit time to boot up and reacquire cellular signal before checking the message status indicators.
4. If problem persists, test with known-good VTM.
5. If problem still persists, Call QES Customer Support at 800-541-7490 for assistance.

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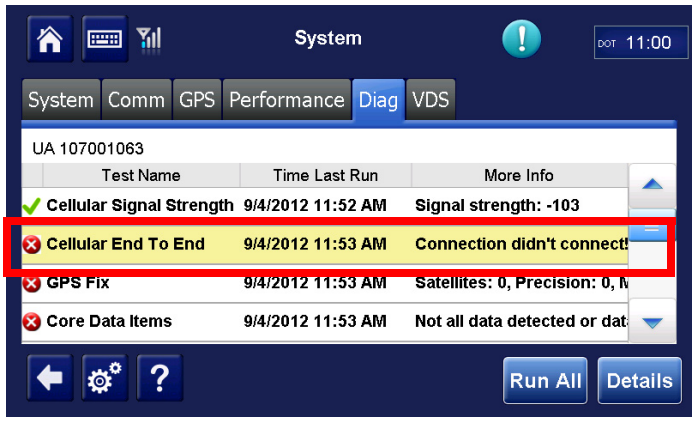
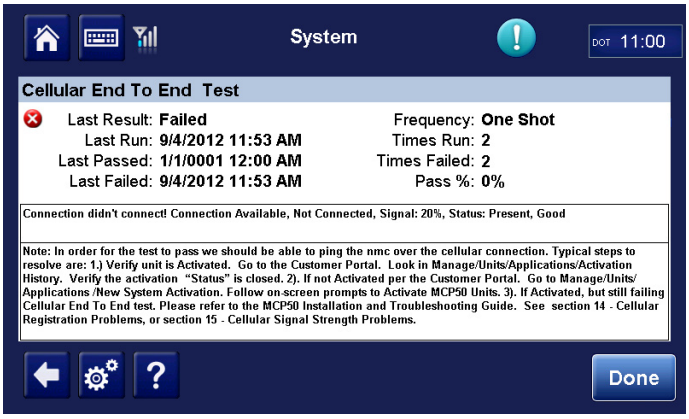
Problem: Cellular End to End Test Fails

If the Cellular End To End test is failing when performing a system verification, the likely cause is the system has not been properly activated.



To see the details of this information:

1. Highlight the **Cellular End To End** Line.
2. Tap the **Details** button. A lot of information is provided at the bottom of the screen.


System
DOT 11:00
Cellular End To End Test
Last Result: Failed
Last Run: 9/4/2012 11:53 AM
Last Passed: 1/1/0001 12:00 AM
Last Failed: 9/4/2012 11:53 AM
Frequency: One Shot
Times Run: 2
Times Failed: 2
Pass %: 0%
Connection didn't connect! Connection Available, Not Connected, Signal: 20%, Status: Present, Good
Note: In order for the test to pass we should be able to ping the nmc over the cellular connection. Typical steps to resolve are: 1.) Verify unit is Activated. Go to the Customer Portal. Look in Manage/Units/Applications/Activation History. Verify the activation "Status" is closed. 2). If not Activated per the Customer Portal. Go to Manage/Units/ Applications /New System Activation. Follow on-screen prompts to Activate MCP50 Units. 3). If Activated, but still failing Cellular End To End test. Please refer to the MCP50 Installation and Troubleshooting Guide. See section 14 - Cellular Registration Problems, or section 15 - Cellular Signal Strength Problems.
Done

3. Tap the **Done** button.

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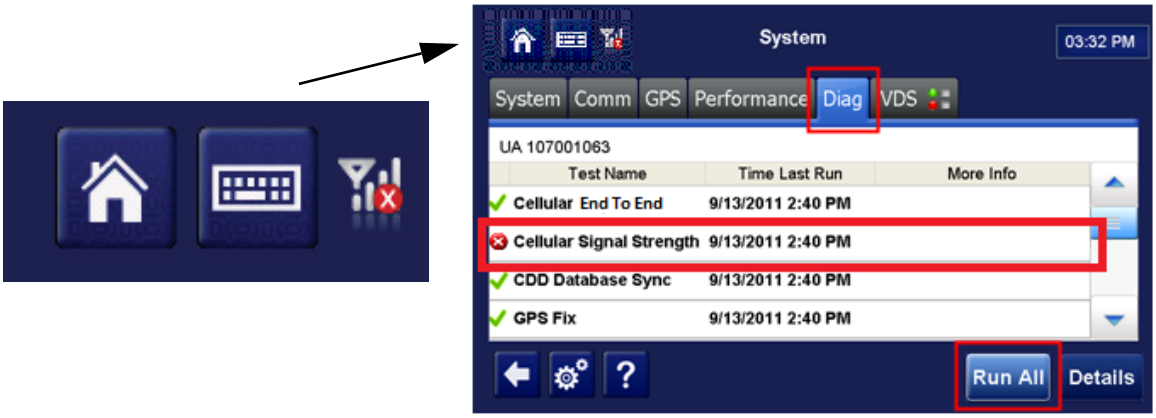
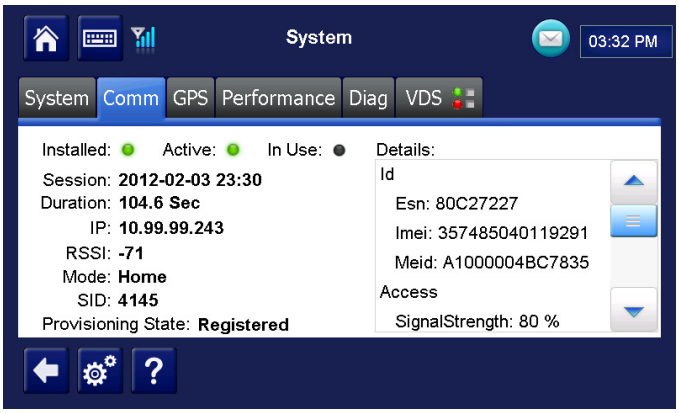
Problem: Cellular Signal Strength Fails

If the Cellular Signal Strength test is failing when performing a system verification, or the cellular icon at the top of the screen shows a red X and no colored bars, follow the steps below.



For detailed information concerning Cellular Signal Strength, tap the **System** button, then tap the **Comm** tab.



RSSI to number of bars:

-50 to -75	four bars
-76 to -85	three bars
-86 to -95	two bars
-96 to -105	one bar
-106 to -109	no bars
-110 to -200	No signal light will come on

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1. Verify that the truck is at a location where there is known to be good cellular coverage.
2. Check to ensure there are no metal obstructions above the antenna.
3. If there are no obstructions, inspect the antenna and antenna cable to ensure there is no damage.
4. Reseat both antenna connections at the VTM. Allow a few minutes to reacquire a cellular signal.
5. If there is still a problem, test with known good antenna.
6. If it continues to have problems, test with known good VTM.

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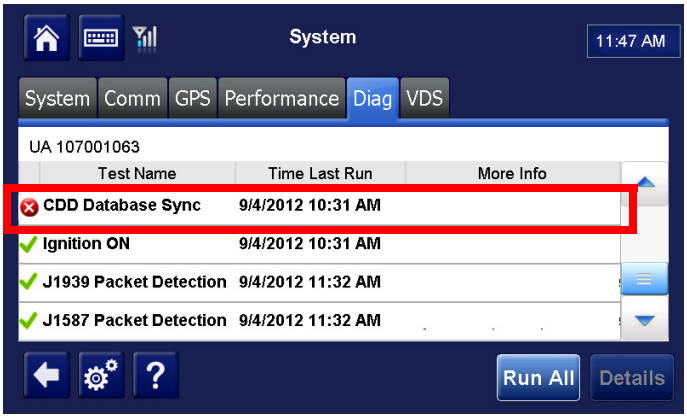
16
CDD Database Sync Problem

Problem: CDD Database Sync Test Fails

.



After an MCP50 is installed and powered up with good signal and line-of-sight to the GPS satellites, it usually takes about 10 minutes for it to get all the company-defined settings and configurations. Once it acquires all settings and configurations, it will go into the desired state of Sync complete. If an MCP50 is installed and powered up and has not gone to a database state of Sync Complete within 10 minutes:

1. Verify that the unit has been properly activated. Make sure that the Cellular End To End passed. See Chapter 2: Activation.

2. Check that the unit has cellular signal and is able to connect. See Chapter 15: Cellular Signal Strength Problems.

3. If it is activated/registered and able to connect, but will not go to a Sync complete state, call QES Customer Support at 800-541-7490 for assistance. Ask for Out of Sync command.

4. If the problem still persists, Replace/RMA DIU.

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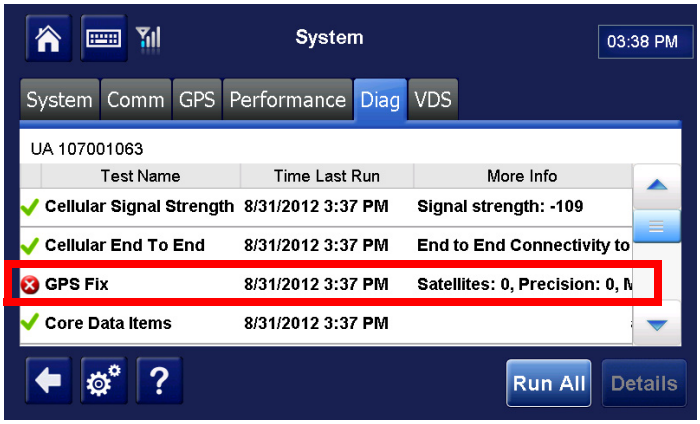
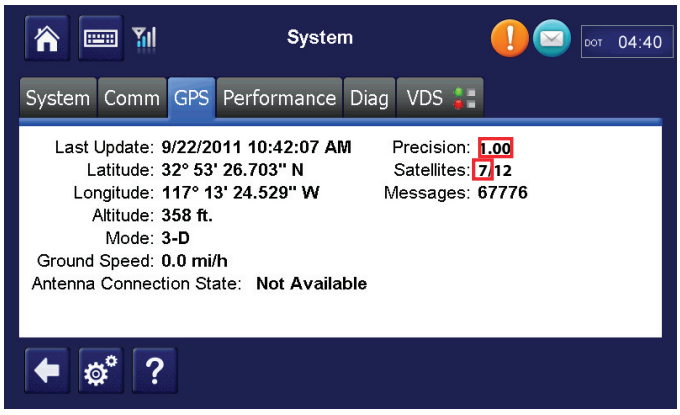
Problem: GPS Fix Test Fails



For more detailed information concerning GPS status, use the **GPS** tab (screen below).

Normally the GPS positioning system will update positioning data every second at the MCP50, as shown in the Last Update field of the **System**->**GPS** tab. The desired value for the Mode field is 3-D, although No Fix may show when the antenna is temporarily blocked or in a garage.



- Precision: should be a value equal to 2 or less
- Satellites: should show a value of 5 or more (***Note:*** *it is the first value shown*)

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If the vehicle is in the open with a clear view of the sky, the mode should show 3-D. The Last Update time should be current, Precision should be <2 and at least 5 Satellites should be used in the fix. If this is not the case, follow the steps below:

1. Verify the antenna is in a location where the view to the sky is not blocked or obstructed.

   Check for any metal obstructions that may block or degrade the GPS signals, such as wires or cables directly above the antenna. If there are any obstructions, remove the obstructions or relocate the antenna.

   The GPS screen has a couple of indicators which may point to a problem with obstruction:

   - The Precision value should be <2. If it is consistently above 3.00, there is likely something interfering with the GPS signals.
   - The Satellites field shows xx/yy, where xx is the number of satellites used in the position fix, and yy is the number of satellites recently viewed. The xx value should be 5 or greater. If it has a value less than 5, there is likely some obstruction.

2. Confirm the antenna is not upside down or has shifted on its side.

   Verify antenna is mounted securely in a horizontal/flat location with arrow pointing to the sky.

3. Check to see if the antenna GPS lead has become disconnected from the VTM.

   Reseat both antenna leads.

4. Test for a faulty antenna or pinched cable lead.

   Test with a known good antenna. Give the unit several minutes to acquire GPS and then check the Mode and Last Update time/date on the GPS screen. If No Fix still appears, the original antenna and cable are probably okay.

5. Test with known good VTM.

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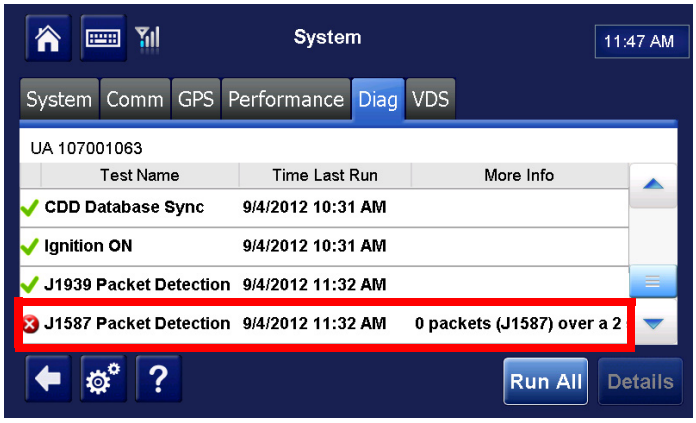
J1587 Packet Detection Problem

Problem: J1587 Packet Detection Fails

Ignition must be ON for the truck to broadcast/supply vehicle data.



Note

*If the **Core Data Items** test passes (i.e. green check), it's acceptable for the **J1587 Packet Detection** test to fail. It would mean that the MCP50 system is getting its vehicle data from the J1939 link.*

In order to get J1587 data, a truck's engine must be supplying the J1587 data, a connection must be made to the J1587 wires (Power/IO cable), and the unit must be configured to look for the J1587 data. Many new trucks/engines do not transmit J1587 packets.

If packets are not detected, check the connections to the J1587 data link and verify that it is properly configured.

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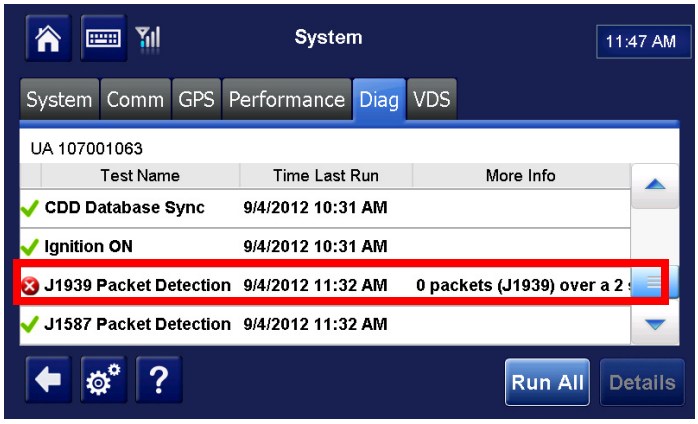
19
J1939 Packet Detection Problem

Problem: J1939 Packet Detection Fails

Ignition must be on for the truck to broadcast/supply vehicle data.



Note

*If the **Core Data Items** test passes (i.e. green check), it's acceptable for the **J1939 Packet Detection** test to fail. It would mean that the MCP50 system is getting its vehicle data from the J1587 link.*

This is determined by the VDS configuration sent to the unit from the Vehicle Data Configuration (VDC) on the Customer Portal. Contractors and Service Centers should first contact the customer to verify that the units were configured correctly.

In order to get J1939 data, a truck's engine must be supplying the J1939 data, a connection must be made to the J1939 wires (Power/IO cable), and the unit must be configured to look for the J1939 data. Many old trucks/engines do not transmit J1939 packets.

If packets are not detected, check the connections to the J1939 data link and verify that it is properly configured.

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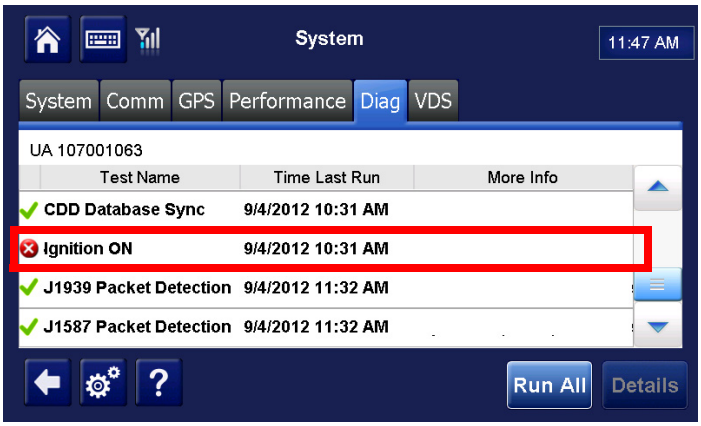
Ignition On Detection Problem

Problem: Ignition On Test Fails



1. If the Ignition On test fails, ensure the truck's ignition switch is in the ON position and confirm:
   - The ignition lead of the Power/IO cable is secure.
   - The fuse in the ignition wire has not blown.
2. If it continues to fail, check the ignition source used and the associated truck fuse. Using a digital volt meter, verify that the source has approximately 12 VDC when key is in the ignition ON position and shows 0 VDC in the OFF position.

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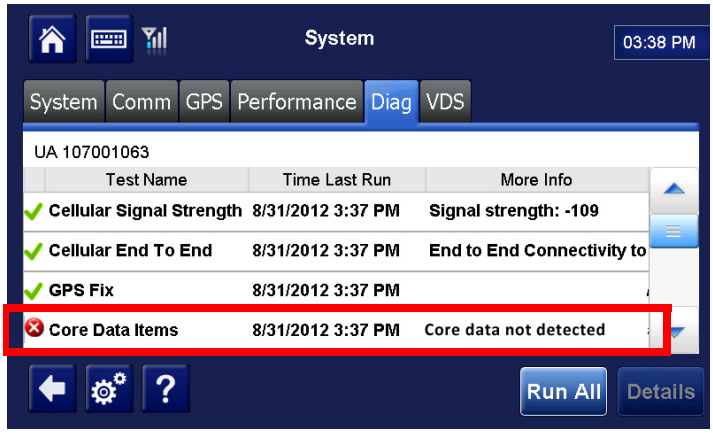
21
Core Data Problem

Problem: Core Data Item Test Fails



The Core Data Items test verifies that specific engine items are being received from one or both of the data links (J1587/J1939). Those items are:

- Speed
- RPM
- Distance LTD
- Fuel LTD
- Engine Hours

If any of these items are not received when the test is run, a failed status will be displayed (red X).

If the Core Data Items test fails, follow these steps:

1. Verify ignition is on.
2. Verify one of the J1587 or J1939 packet detection tests passes. This means that the MCP50 system is getting data from at least one data source.
3. Highlight the Core Data Items line by tapping it, and then tap the **Details** button at the lower right corner of the screen.

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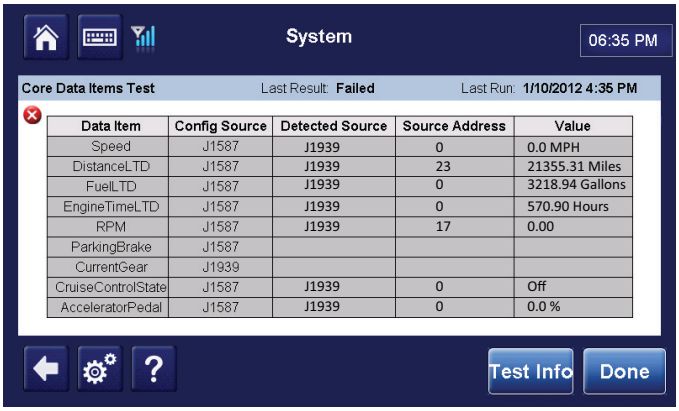

Data Item	Config Source	Detected Source	Source Address	Value
Speed	J1587	J1939	0	0.0 MPH
DistanceLTD	J1587	J1939	23	21355.31 Miles
FuelLTD	J1587	J1939	0	3218.94 Gallons
EngineTimeLTD	J1587	J1939	0	570.90 Hours
RPM	J1587	J1939	17	0.00
ParkingBrake	J1587			
CurrentGear	J1939			
CruiseControlState	J1587	J1939	0	Off
AcceleratorPedal	J1587	J1939	0	0.0 %

A detected source and source address must be populated for Speed, Distance LTD, Fuel/LTD, Engine Time LTD, and RPM.

4. Verify the unit is configured correctly for the vehicle data source. Log on to the Customer Portal and select **Vehicle Data Configuration** to verify or change the configuration. Contractors and Service Centers should first contact the customer to verify that the units were configured correctly

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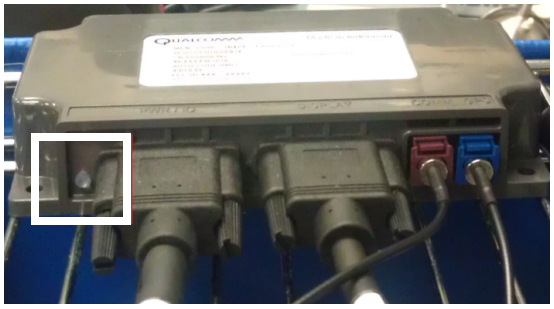
VTM LED Indicator

VTM Performance—LED Indicators



In a normal operating environment, the LED will be OFF.

Other operating modes are shown below:

State	***VTM indicator***	***Action***
Normal Mode	OFF	None
Sleep Mode	OFF	None
Boot up and System Recovery Mode	A Red LED will blink ON and OFF at irregular frequencies. ***Note:*** *this should last no more than 5 minutes.*	Give unit 5 minutes to boot or recover
Under voltage Mode	A Red LED will blink very quickly	Check power source
Scheduler Failure Mode	A Red LED on solid	Test with known-good VTM

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Acquiring Network Problem

Problem: Stuck on Acquiring Network Screen

When an MCP50 unit boots up, it will attempt to get the system time/date from either the cellular network or from GPS. Under normal circumstances, it will get these values in 30 seconds to a minute and load the applications. While it is acquiring the time/date the screen below will be displayed:

If the unit is unsuccessful in getting the time/date values from the network, it will attempt to reboot after a few minutes.

If the MCP50 system is frequently taking longer than 1 minute to acquire the network, it could be because:

- Out of cellular coverage
- Antenna is blocked/obstructed and GPS signals are not being received

If the MCP50 system continues to cycle through showing the acquiring screen and rebooting process, follow the steps in this section.

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1. Reseat the antenna connections to the VTM. Inspect the cable connections to ensure there isn't any damage.

2. If the problem persists after reseating the cable connections, test with a known-good antenna. Ensure there are no obstructions above the antenna.
3. If the problem still continues, test with a known-good VTM.
4. If the problem still continues, test with a known-good DIU.

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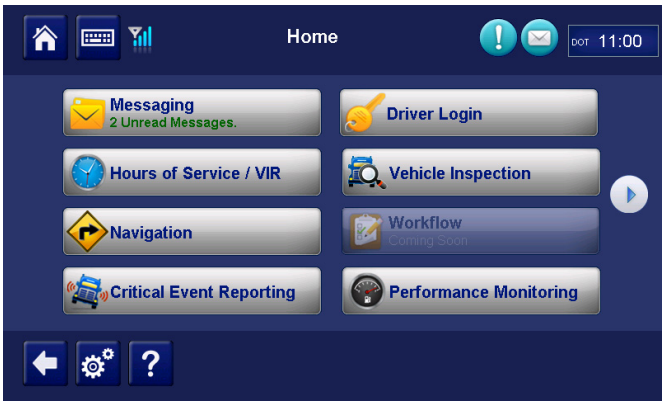
Performance Monitoring Troubleshooting

System Overview

Connecting to the truck's data link is required for the Performance Monitoring application. The truck must also have the proper Data Bus configuration for the MCP50 to access the truck's data. This can be set up via the Vehicle Data Configurator on the Customer Portal.

The Performance Monitoring application records data from the vehicle such as speed, distance, RPMs, and fuel used.The data is retrieved from the truck by the MCP50 and sent to the host computer, either manually or automatically at preset intervals.

The hardware installation on the vehicle consists of connecting the MCP50 Power/IO connector to the truck's diagnostic connector.



Note

*If the **Performance Monitoring** icon is grayed out, the Performance Monitoring application is not enabled. Call your **company dispatch** to have this application enabled.*

Normal Performance

Once the Power/IO connection to the truck's diagnostic connector has been made, company-defined parameters are sent and received by the unit, performance monitoring data will be recorded at the mobile and sent to the host system.

To confirm normal performance, first verify that performance monitoring parameters have been sent to the unit and received. Tap the **Parameters** tab within the Performance Monitoring application and verify the tag field is not "0."

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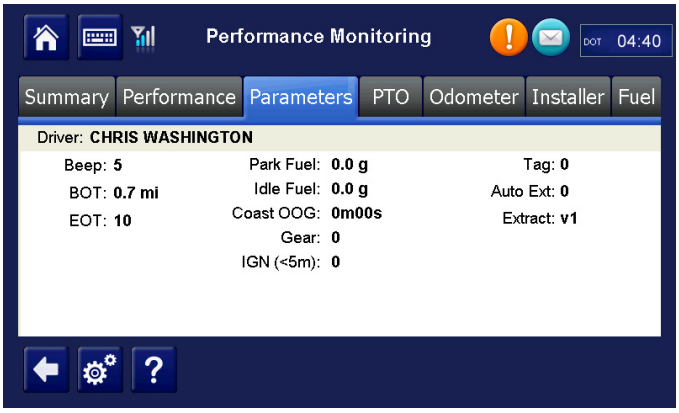
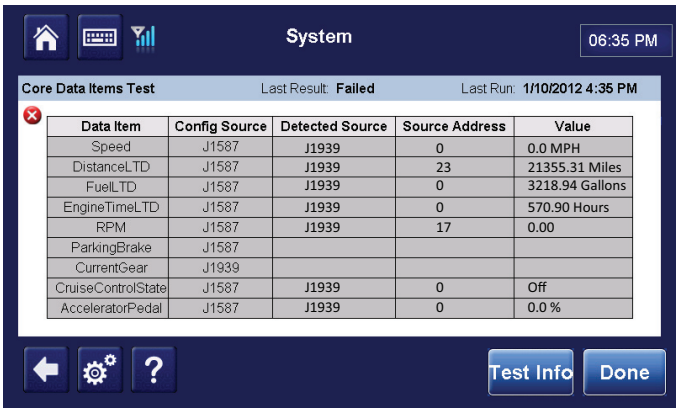


A tag of “0” indicates that the unit has not received it s parameters. Call your company dispatch administrator and ask for the parameters to be sent. A non-zero tag indicates that the unit has received parameters.

The Core Data Items test checks for all essential data items for Performance Monitoring.With ignition in the ON position, review data that is available listed under the **System**->**Diag** tab **Core Data Item**s->**Details**.



Data Item	Config Source	Detected Source	Source Address	Value
Speed	J1587	J1939	0	0.0 MPH
DistanceLTD	J1587	J1939	23	21355.31 Miles
FuelLTD	J1587	J1939	0	3218.94 Gallons
EngineTimeLTD	J1587	J1939	0	570.90 Hours
RPM	J1587	J1939	17	0.00
ParkingBrake	J1587			
CurrentGear	J1939			
CruiseControlState	J1587	J1939	0	Off
AcceleratorPedal	J1587	J1939	0	0.0 %

At a minimum, Performance Monitoring needs current data from Speed, EngineRPM, Fuel, and DistanceLTD. These are checked for when a system verification is run. The core data items verifies these are received. The screen above shows how the unit is configured, if an item is detected, and the source address if detected.

If any data items are not present:

Ensure the MCP50 is configured for the right Data Bus using the Vehicle Data Configurator.

If problem persists, contact QES Customer Support at 800-541-7490 for assistance.

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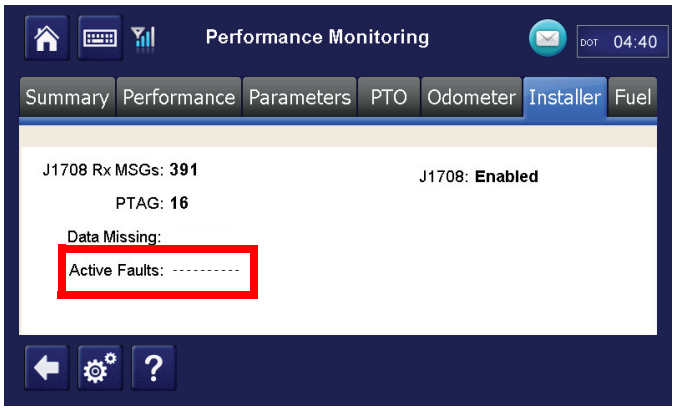
Performance Monitoring Faults and Descriptions

Monitored Active Faults are controlled by the Customer Specified parameters sent to the unit. The following chart shows the faults that may surface.



Active Fault Field Value Definitions			
Display Shows	***Associated Fault***	***Description/Symptom***	***Possible Cause***
+		Fault no longer active	Cleared
-		Fault not monitored	Performance monitoring parameters specified not to monitor.
0	No Power (MCP50)	Power detected OFF for more than the wake-up time.	Main power was lost, causing the MCP to stay asleep longer than its wake-up interval.
1	RPM Zero (MCP50)	RPM zero when speed is non-zero.	- RPM sensor or connection problem. - J1708 selection parameter set wrong. - In rare cases, no idle can be caused by faulty axle sensor input (e.g., wires reversed) causing a positive reading for speed while the vehicle is stationary.
2	Bad Ignition (MCP50)	Ignition OFF and speed or RPM non-zero.	Problem with MCP50's ignition line wiring or fuse.
3	RPM Sensor (MCP50)	Engine posted PID (194) and PID (190).	RPM sensor or connection problem to the engine, detected by the engine's diagnostics.
4	Speed Sensor (MCP50)	Engine posted PID (194) and PID (84).	Speed sensor or connection problem to engine, detected by the engine's diagnostics.

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Active Fault Field Value Definitions (Continued)			
Display Shows	***Associated Fault***	***Description/Symptom***	***Possible Cause***
9	LTD Mismatch (MCP50)	LTD mismatch with stored MCP50 data.	- Engine run with main power disconnected. - Engine run with data link disconnected. - Engine run with ignition line disconnected.
A	Bad Speed (MCP50)	More than 2 hrs IGN = ON with Spd = 0, RPM greater than 1300.	- Speed sensor or connection problem:MCP50. - Speed sensor or connection problem: engine. - Engine speed sensor parameter not enabled.
B	0 Spd and RPM (MCP50)	More than 2 hrs with IGN = ON with Spd = 0, RPM = 0.	- Disconnect of entire accessory cable. - J1708 selection parameter set wrong. - Data link connection problem. - Driver using ignition position for accessory operation. - MCP50 ignition line wired to accessory position.
D	MCP50 Speed (MCP)	Speed signal constant for more than 5 minutes.	A pulse generator may have been connected to either the MCP50 or the engine.
E	Hard Braking Event	Speed is suddenly decreased by more than 9 MPH/second (speed must be above 20 MPH for this fault to occur.	Driver is braking too quickly (hard braked).

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Critical Event Reporting Troubleshooting

Overview

Critical Event Reporting (CER) captures and reports vehicle critical event information (e.g., hard braking, vehicle speed, location, stability control (VDC), lane departure warning (LDW), and panic button events). With each hard braking event, five minutes of speed information is recorded and sent to the CER host system. Events are processed two minutes after they occur.

Normal Performance

In order for the CER feature to function, the MCP50 must be connected to the vehicle's data link wires.

Critical events can be triggered by a:

- Hard Brake event
- Stability Control event (if available)
- Lane Departure Warning (LDW) (if option is installed)
- Manually triggered CER event.

Text-to-speech (TTS) can be enabled so CER events can be audibly conveyed to the driver.

Abnormal Performance

If any of the above items do not trigger a CER event, or if a critical event is reported in error, there is a problem. A problem is usually caused by one or more of the following:

- The unit is misconfigured
- Loose or bad connection to the data link
- Intermittent data supplied by stability control device or lane departure warning device
- Intermittent data supplied by ECM of vehicle

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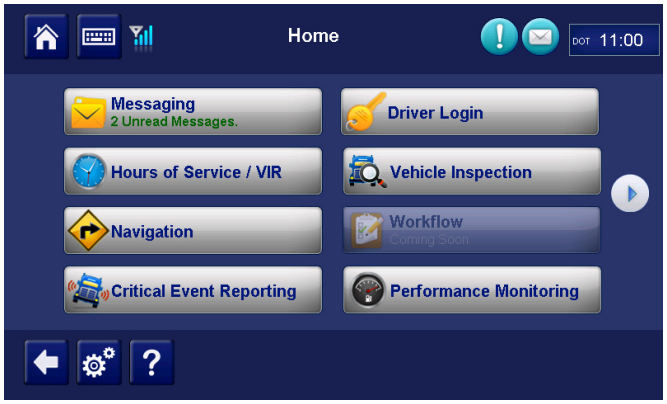
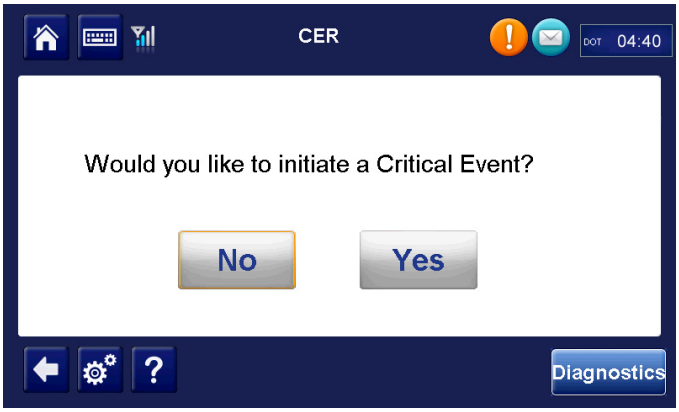
Event Not Triggered

CER Verify Configuration

1. To access CER information, go to the **Home** screen and tap the **Critical Event Reporting** button. If this button is grayed out, then CER service for the unit must be enabled from the Customer Portal.



2. A popup will appear. Tap the **Diagnostics** button.



3. Select one of the tabs for General, Roll Stability, Lane Departure information, or Collision Warning.

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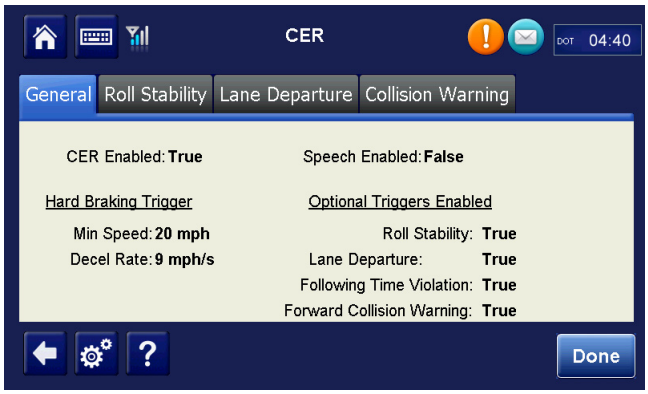

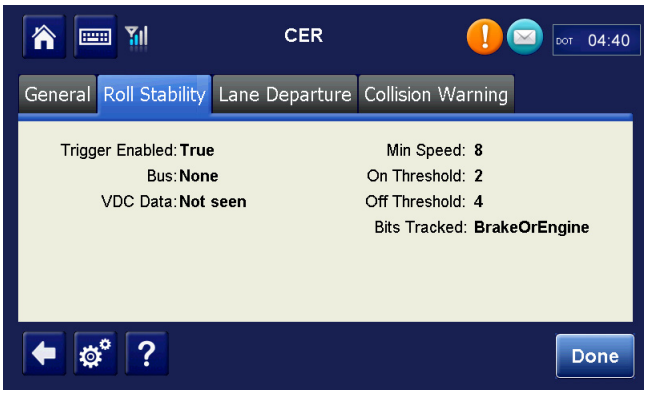

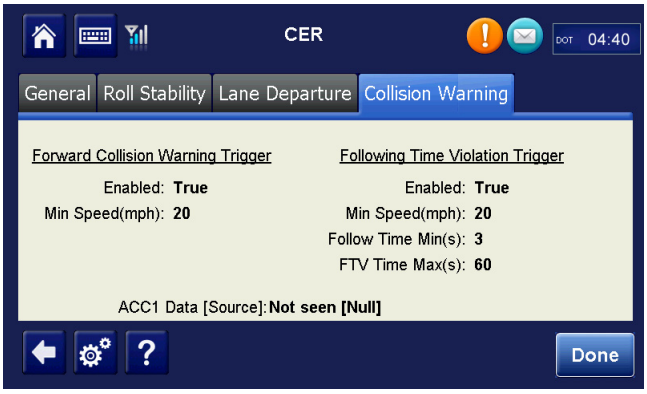

Field	***Value***
CER Enabled/Disabled	If enabled, the MCP captures CER events.
Speech Enabled/Disabled	If enabled, the text in the alert pop-ups is spoken.
Hard Braking Minimum Speed	The speed at which mobile unit detects hard brake events.
Hard Braking Deceleration Rate	The rate of deceleration that triggers a hard brake event (Default = 9 MPH/SEC).
Stability Control (VDC) Enabled/ Disabled	Stability control is enabled/disabled.
Minimum Speed	Minimum speed at which mobile unit detects events.
On/Off Threshold	Number of notifications that must be seen in a row before an event is considered to be in progress.
VDC/LDW Bits Tracked	Setting that determines which bits the mobile unit tracks to monitor stability control events: Brake bits only, Engine bits only, Brake or Engine bits (Default), Brake and Engine bits
Lane Departure Enabled	Lane Departure Warning is enabled.
Bus	J1587 or J1939
VDC/LDW Data	Available or not seen
LDW Events Count	Number of LDW events that occur within the LDW Time Threshold before CER sends a notification.
LDW Events Time (mins)	Number of minutes that pass before LDW events are detected and CER sends a notification.

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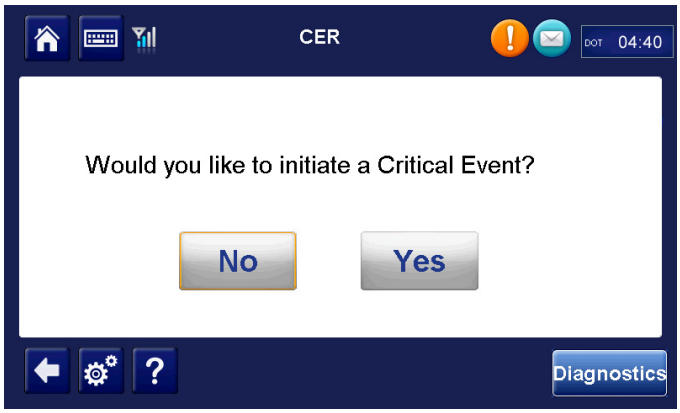
Hard braking gets information from either J1708/1587 or J1939. One of the two indicator lights must be green to record hard braking events correctly. Some filtering is done to prevent erroneous CER events due to faulty truck speed sensors.

Sending a Manual CER Event

1. From the **Home** screen, tap the **Critical Event Reporting** button. Tap **Yes** to initiate an event.



Note: *The CER message is sent to the NOC.*

2. Verify that the host receives the CER event message and that data is present.

Events Triggered in Error

- For hard braking events triggered in error, verify configuration values, hard braking minimum speed and hard braking deceleration rate.

  Note*: False hard braking events are typically caused by a faulty speed sensor.*

- For stability control events triggered in error, verify configuration values minimum speed and on/off threshold.
- Roll stability events are sent from the power train or braking control units installed on the truck. The MCP50 system acts as a pass through for these devices. If false events are being recorded, those devices should be investigated.

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Optional Accessories Troubleshooting

This section reserved for future use.

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A. Wiring Diagrams and Charts

B. Environmental and Power Requirements

C. General Wiring and Installation Guidelines

D. Standard RMA Procedure

E. Upgrading the MCP50 Using USB Memory Sticks

F. Preventive Maintenance Inspection

G. Component Information

H. Installation Form

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A
Wiring Diagrams and Charts

MCP50 Wiring Diagram

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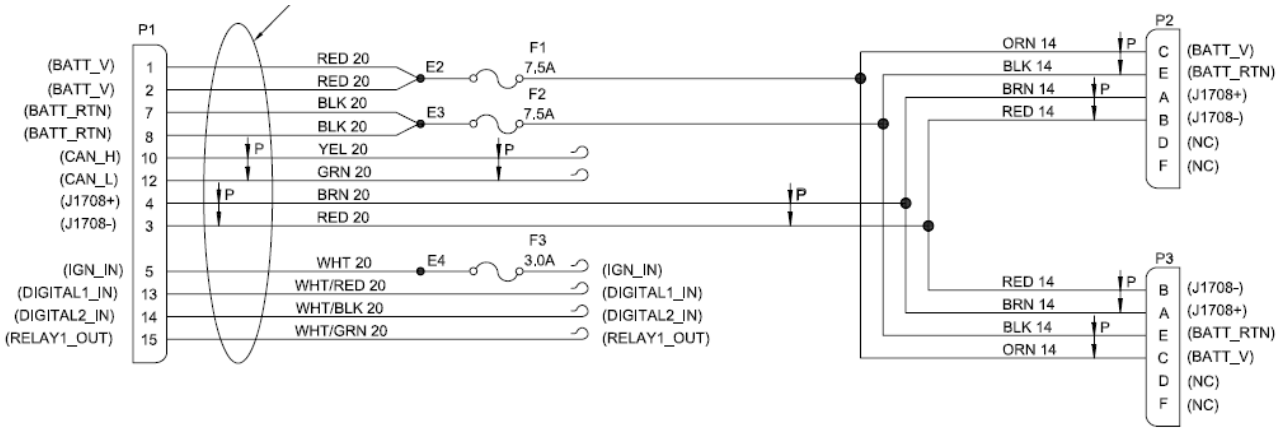
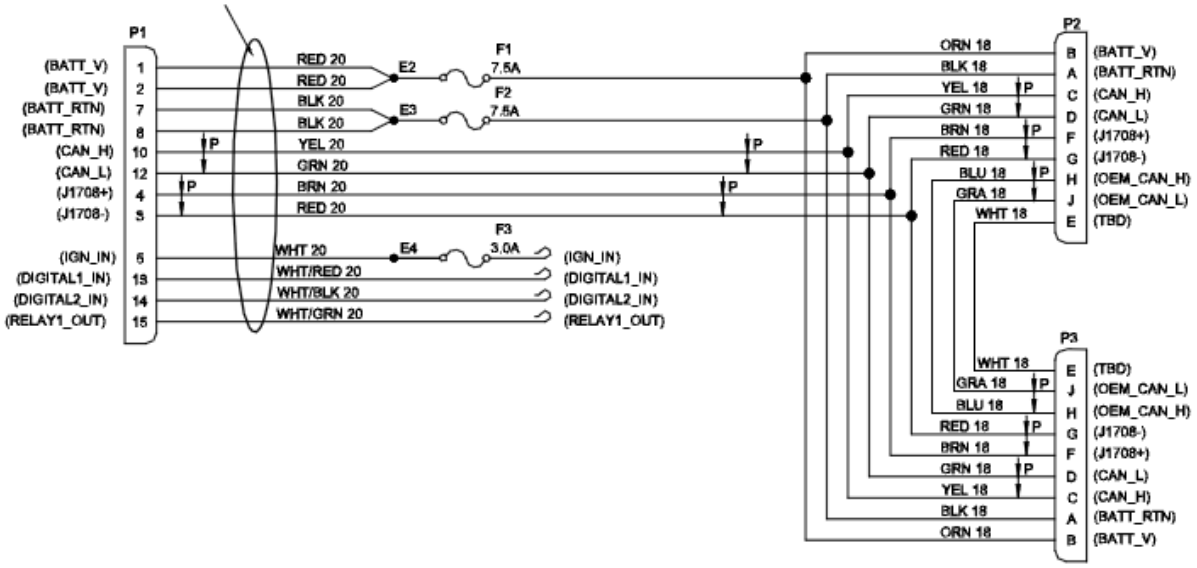
Power/IO Cable Connector Pin Callouts

6-Pin Power/IO Cable



9-Pin Power/IO Cable



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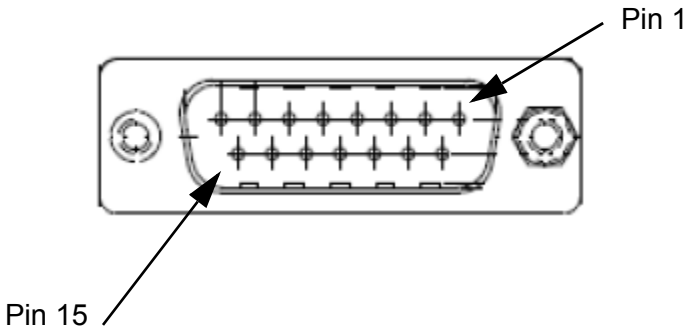
Display Interface Unit 50 (DIU50) Cable Connector Pin Callouts

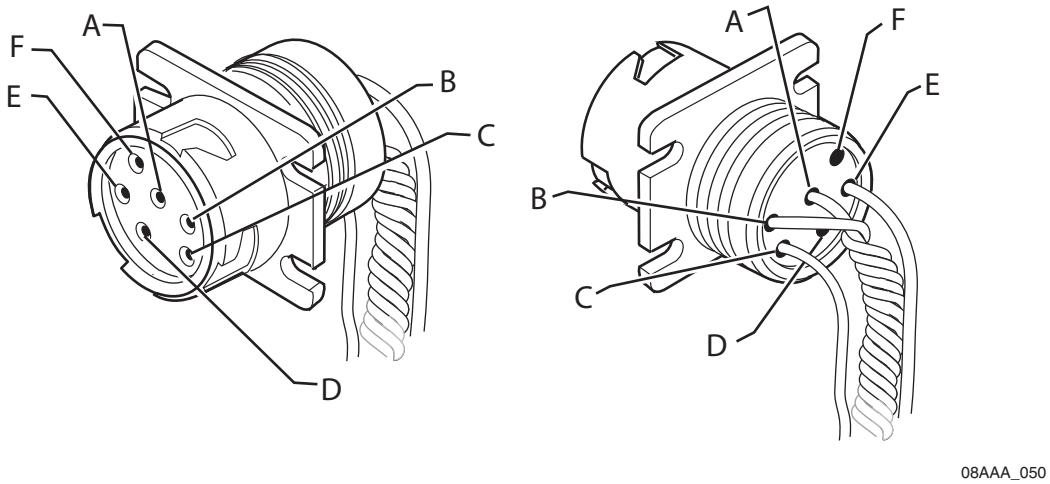


Note: *the DIU50 has no user-serviceable parts.*

Pin	Signal
8 15	DIU_PWR
7 14	DIU_GND
10	DIU_TX
4	DIU_RX
11	DIU_RTS
6	DIU_CTS
3	DIU_DSR
5	DIU_DCD
13	DIU_RI
1 9	USB_DP USB_DM
2	N/C

MAY CONTAIN U.S. AND INTERNATIONAL EXPORT CONTROLLED INFORMATION

Six-pin Data Link Connector Pin Callouts



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SIGNAL	PIN
J1708/J1587 DATA LINK+	A
J1708/J1587 DATA LINK-	B
+12VDC	C
N/C	D
BATTERY GROUND	E
N/C	F

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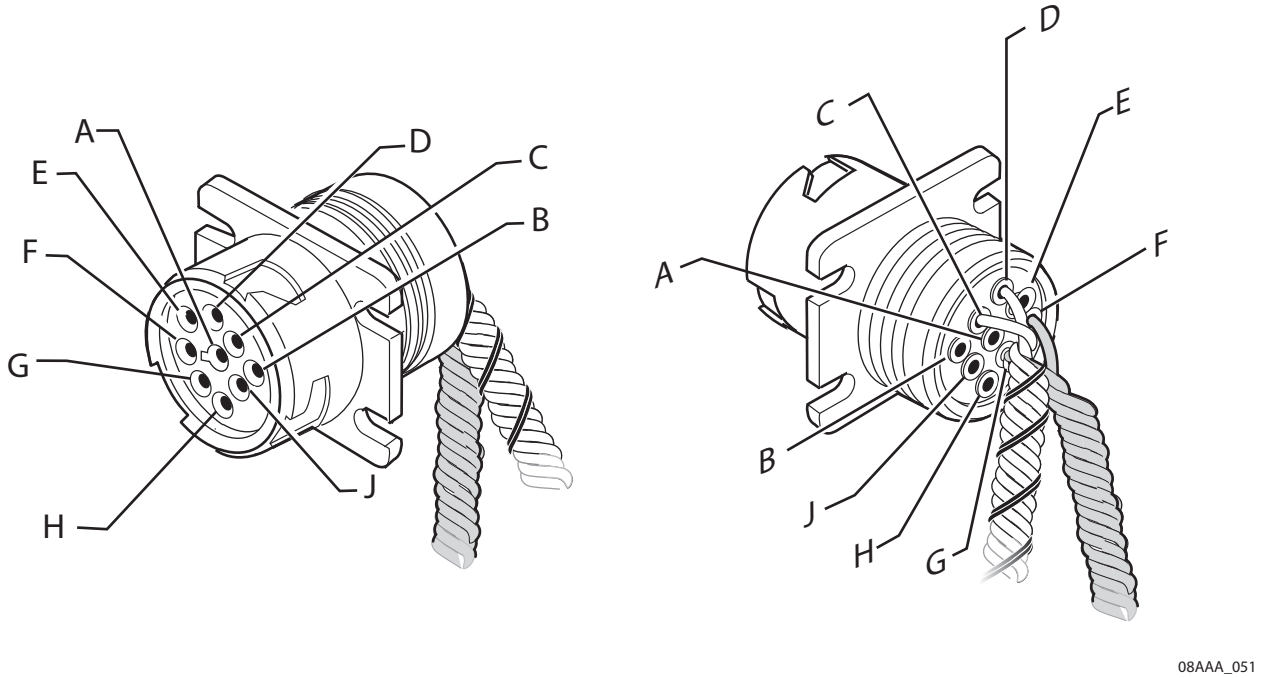
Nine-pin Data Link Connector Pin Callouts



SIGNAL	PIN
BATTERY GROUND	A
+12VDC	B
J1939 DATA LINK+	C
J1939 DATA LINK-	D
J1939 SHIELD	E
J1708/J1587 DATA LINK+	F
J1708/J1587 DATA LINK-	G
OEM_CAN_H	H
OEM_CAN_L	J

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B
Environmental and Power Requirements

MCP50 Environmental and Power Requirements

Condition	*Requirement*
Operating Temperature	-30° C to 70° C (-35° F to 158° F)
Vibration/Shock	Vehicle Telematics Module 50 (VTM50) does not have a shock tray. VTM must be mounted securely.
Humidity	
Antenna	Not watertight. DO NOT get wet.
VTM50	Not watertight. DO NOT get wet.
Display interface unit 50 (DIU50)	Not watertight. Turn over immediately if liquids are spilled on it.
Power	+6 to +18 Volts DC
Operating at +12V (VTM and DIU)	MCP50 draws a maximum of 2 amps. Average current draw is approx. 1 amp.
Asleep	MCP50 draws 10 mA.

The MCP50 system has no user-serviceable parts. The DIU50 contains a permanent lithium coin cell for maintaining the real time clock; proper recycling or disposal per local law is required for all components of MCP50.

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C
General Wiring and Installation Guidelines

Making Electrical Connections - Standard Installations

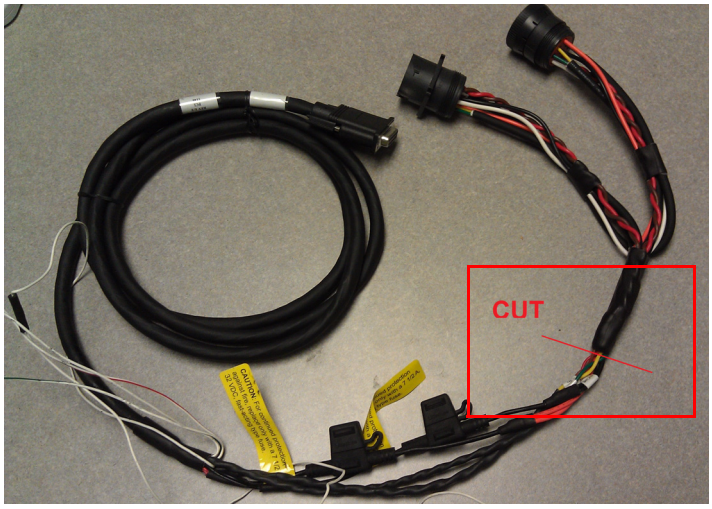
For standard MCP50 installations, the only electrical connection needed to the truck will be the power/IO cable and an ignition wire lead. Cable connectors are used at the VTM for the antenna, power/datalink, and display.

Cutting and Splicing Power/IO Cable - Non-standard Installation

Some trucks may use a different 9-pin diagnostic connector than supplied on the Qualcomm “Y” cable. The connector on the Qualcomm cable may not easily mount in the dash. Therefore, it may be necessary to make direct butt splice connections.

If the available Power/IO cable does not mate to the truck’s diagnostic connector, the “Y” portion of the cable can be cut off and the leads spliced into an appropriate source:

- BATT_V to 12 VDC unswitched source
- BATT_RTN to chassis ground
- J1708+ to positive J1587 truck wire
- J1708- to negative J1587 truck wire
- CAN_H to J1939+ truck wire (yellow to yellow)
- CAN_L to J1939- truck wire (green to green)



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Approved Qualcomm Electrical Connectors

The wiring for the MCP50 system is expected to be inside the cab. The only Qualcomm-approved electrical connections other than standard connectors are crimp butt splices and crimp ring terminals. Connections are typically made by mating the two connectors. Many of the following general guidelines apply to non-standard MCP50 connections where the Power/IO cable must be cut because it does easily mount in the truck's dashboard.

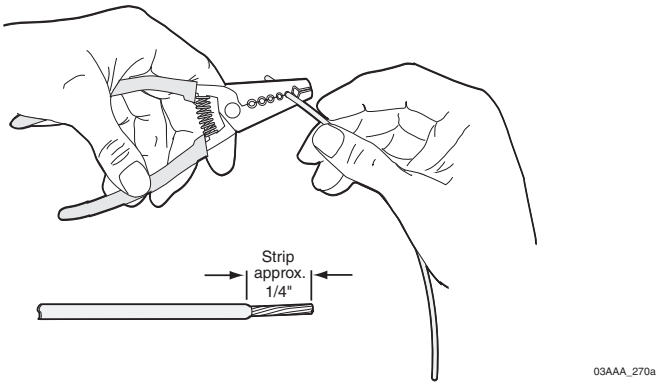
> ***Caution***
>
> *Not following proper wiring guidelines and using improper crimps and butt splices may cause intermittent connections and may result in unexpected truck down time or system failure.*

Wire Stripping

> ***Caution***
>
> *Use care in stripping wires. Vibration can cause nicked wires to fail. Using wire cutters, knives, or other tools can damage the conductor wire and/or insulation.*

Knowing and following proper wire stripping techniques is essential for performing successful and safe electrical connections of all system components.

1. Using a wire stripper, strip approximately 1/4" off the end of an insulated wire.



2. After stripping the wire, verify that the wire is not severed, nicked, or damaged by the stripping tool. If the wire has been properly stripped, it is ready to be butt spliced. If the wire has been damaged, restrip the wire (see step 1.).

Butt Splicing

- Qualcomm recommends Nylon insulated, seamless butt connectors with inspection windows.
- Heat-shrinkable butt connectors are preferred.

Make sure the size of the butt splice is appropriate for the job. A good butt splice has these characteristics:

- The ends of the bare wires are visible through an inspection window.
- The ends of the wires “butt” up against the stop.
- The wires are not exposed beyond splice shielding.
- Crimping does not sever or damage the wires or insulation.

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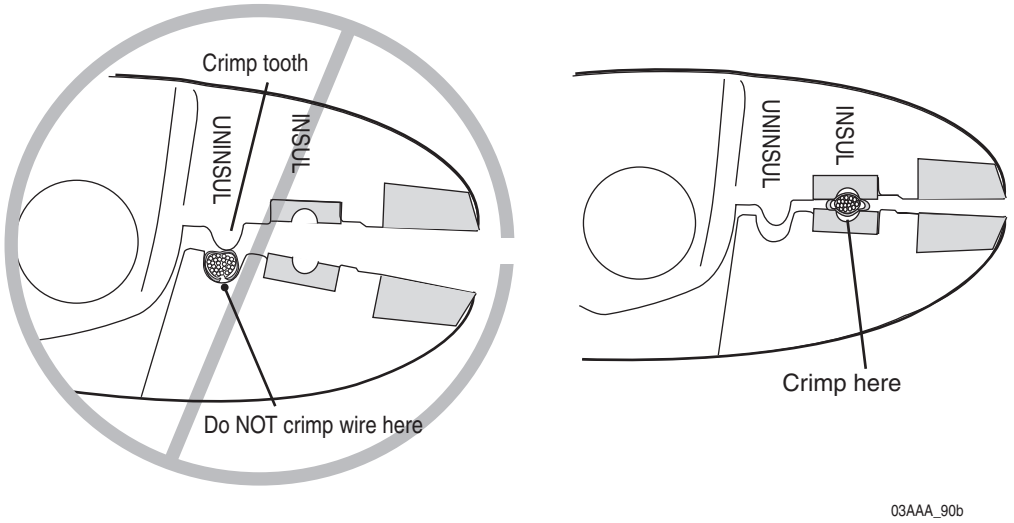
Crimping

- When crimping a butt-spliced wire or cable, be sure the insulated butt splice is crimped using the insulated position on the crimp tool and not the crimping “tooth” of the tool.
- Crimping butt splices incorrectly can result in a severed wire and a failed wire connection.

Caution

DO NOT crimp on the crimp “tooth.”



1. Using a crimping tool, crimp the butt splice one end at a time. **First**, crimp the inside crimp area where the wire has been stripped. Apply necessary pressure to this inside area.

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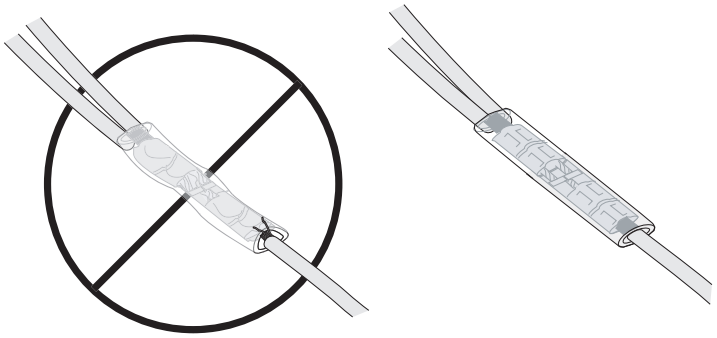
Note

The objective is to apply only the necessary pressure to crimp the butt splice closed and hold the wire connections together. ***Do not*** *apply so much pressure as to crush the butt splice and sever the wire or the insulation on the wire.*



WRONG
Butt splice is visibly crushed, possibly damaging the wire and the wire connection.

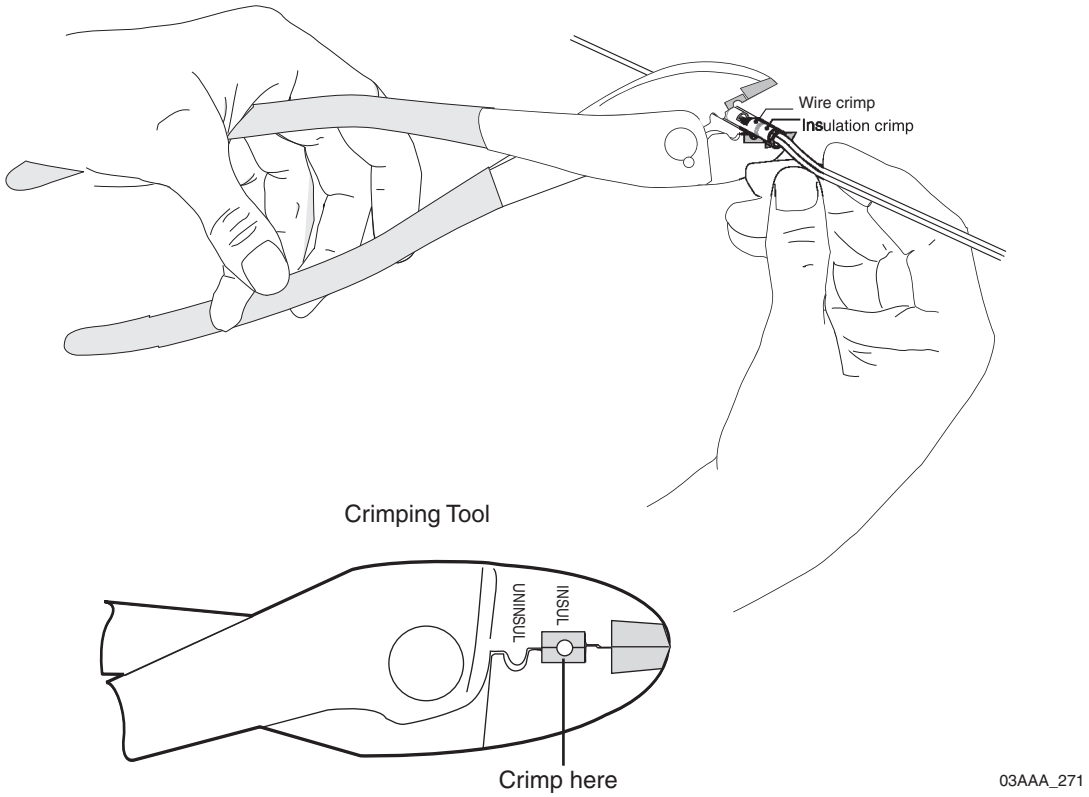
Some wires are exposed.

CORRECT
Crimping is done properly, protecting the wire and the wire connection.

No exposed wires.

03AAA_277A

2. After crimping the inside of both ends of the butt splice on the “insulated” area of the crimping tool, next crimp the outside of both ends of the butt splice.



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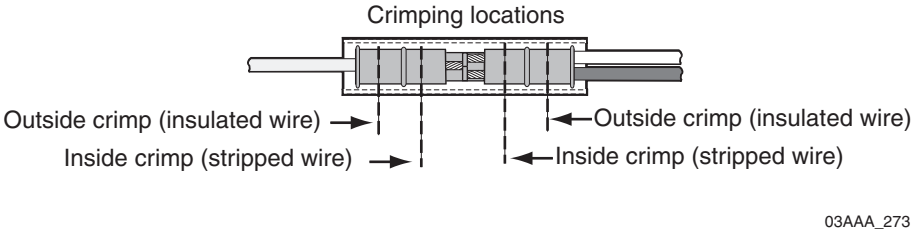
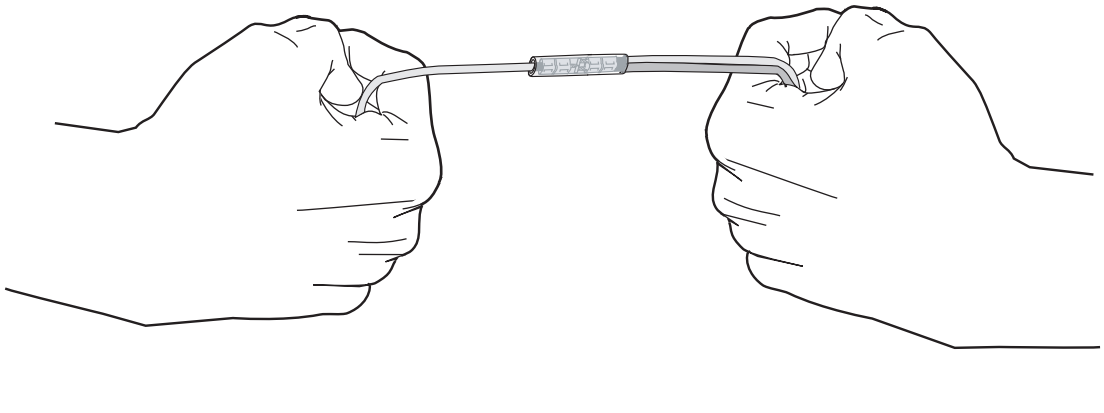


3. Verify that the crimps are good and the wires have not been damaged.

4. Do a pull test. Pull on both ends of the wires to ensure a solid butt-spliced connection exists. The crimped butt splice securely grips the insulated wires.



WARNING

If using heat shrinkable crimps, DO NOT use a heat gun or open flame near combustible materials. Use a heat gun only *when it is safe and appropriate to do so. Protect surrounding wiring and other components when using a heat gun.*

Ring Terminals

When making electrical connections, crimp ring terminals onto the ends of the wires to ensure good contacts. A properly crimped ring terminal has these characteristics:

- The barrel crimping indent is well-formed and properly positioned.
- The insulated wire's grip impression is well-formed and provides proper support without crushing the insulation.
- The wire does not move independently of the lug. Firmly tug on the ring terminal to ensure it does not pull loose.
- The end of the bare wire protrudes through the crimp barrel approximately 0.03 to 0.125" depending on the lug size and crimp tool.

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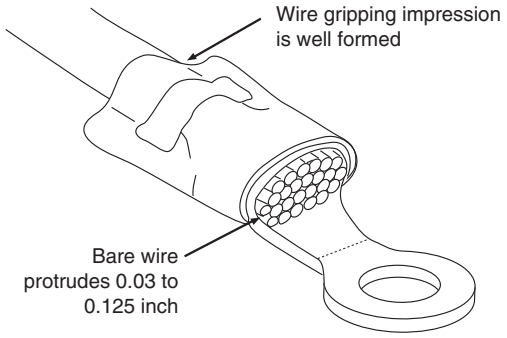
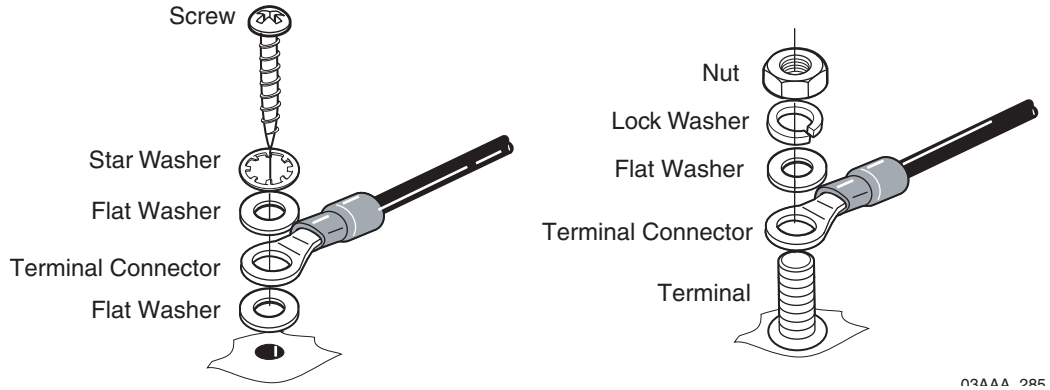


Install the ring terminal on the ground connection using one of the following options:



Proper Grounding

When establishing a good chassis ground, avoid areas that may be potentially isolated from ground by a hinge or bad welds. It is extremely important that you create clean, secure, tight, metal-to-metal grounds. If grounding terminals are not available, remove the paint from the surface of the metal connected to the chassis to make the ground. Make sure the wires are not strained or vulnerable to damage.

WARNING

Not following proper grounding guidelines may cause intermittent connections and may result in unexpected truck downtime or system failure.

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General Installation Guidelines

- Determine the most direct and protected route when routing cables to connect the components to each other and to the vehicle.
- Do not trim cable lengths to fit a specific vehicle.
- Use only wire strippers for stripping wires.
- Use only the appropriate insulated crimping tool for crimping insulated connectors.
- Use existing holes for cable routing whenever possible.
- Avoid running cable over or near heat sources.

Routing and Protecting Cables

- Provide strain relief for all cables
- Use tie wraps
- Debur any drilled holes

DO NOT route cables:

- Near audio system amplifiers
- Near exhaust pipes and other sources of heat
- Near the brake, clutch, or accelerator pedals, and linkage
- Near foot traffic areas
- Near the windshield wiper mechanism
- Near CB radio wires
- Over sharp edges
- Over moving parts

Special Interior Routing Guidelines

- Route cables under kick plates or carpets.
- Avoid high foot traffic areas.
- When reinstalling dash panels, be careful that screws do not penetrate cables.
- Route cables with any existing vehicle cables.

Storing Excess Cabling

- Secure excess cabling with tie wraps.
- Stow out of sight.

Stress Relief

- Ensure cables have enough slack so connections are not being pulled.

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D
Standard RMA Procedure

To return failed equipment, go to Qualcomm Customer Portal at
https://customer.myqualcomm.com

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E
Upgrading the MCP50 Using USB Memory Sticks

Before You Start

During an OS or application upgrade, driver and vehicle information can be deleted. The list below will help minimize any inconvenience this causes.

- Confirm that the driver knows that all stored messages will be lost.

  The driver should write down any information he thinks he may need later, from both his inbox and his outbox.

- Confirm that he has listened to any unopened audio files.

  This is necessary only if your company uses Qualcomm's Content Delivery service. Deleted audio files will not be resent to the vehicle.

- Determine if certain special services are enabled for this vehicle.

  From the display unit's Home screen, check to see if the following services are accessible:

  - Driver Workflow
  - Content Delivery
  - Hours of Service
  - Navigation
  - Performance Monitoring

Requirements for Certain Services

For everything except Hours of Service and Navigation, there are required tasks that you or someone else must complete before the upgrade. If you don't, important data may be lost.

Driver Workflow: The trip plan and any pre-plans will be deleted during the upgrade.

- **Before**: The driver should write down the details of the next stop in the trip plan.
- **After the upgrade**: the driver should ask dispatch to resend the current trip plan and any pre-plans.

Hours of Service: Normally, no HOS data will be lost.

- **Before**: none. The driver's logs are sent to the company's HOS database when the driver logs off the unit.
- **After the upgrade**: the logs are automatically resent to the vehicle the next time the driver logs into HOS. Remind the driver that he needs to account for his time during the upgrade and record the proper duty status. Recommend that the driver pay special attention to that day the next time he approves the logs.

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Navigation: The current route will be deleted during the upgrade.

- **Before**: none.
- **After the upgrade**: The driver needs to ask dispatch to resend the list of stops for the current trip.

Performance Monitoring: Performance Monitoring data on the unit is deleted during an upgrade.

- **Before**: Your company's System Administrator needs to take steps to ensure the data is not lost by manually extracting the performance data stored in the vehicle's MAS. For the Qualcomm Services Portal (QSP), instructions are in *Performance Monitoring: Administration and Configuration Guide* (80-JA316-3). For AS/400®, they can refer to the *SensorTRACS®/400 User's Guide, Version 2.3* (80-30597-4). Remind Operations that your Qualcomm representative can also help the System Administrators with this task.
- **After the upgrade**: Contact Operations and have a System Administrator resend the vehicle's Performance Monitoring parameters.

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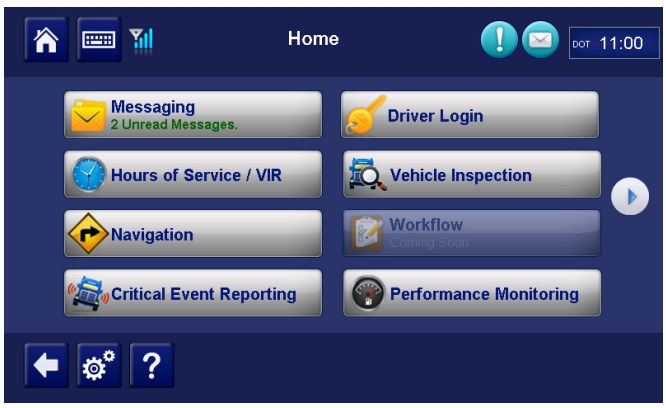
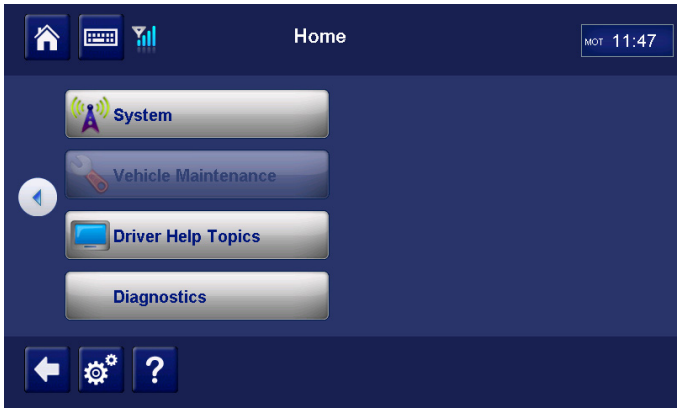
Checking the Software Versions Installed

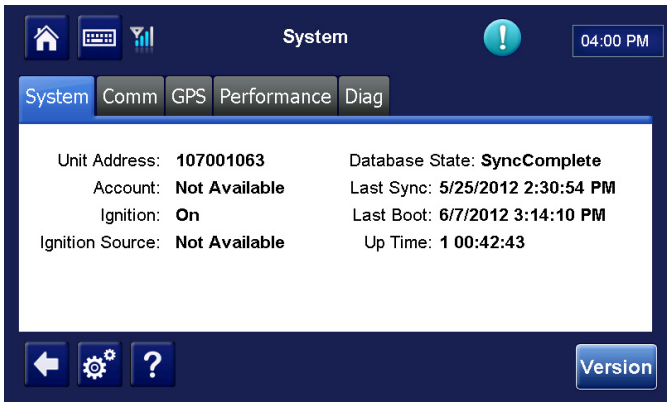
Shortly after you power up the MCP50, the user interface screen displays.

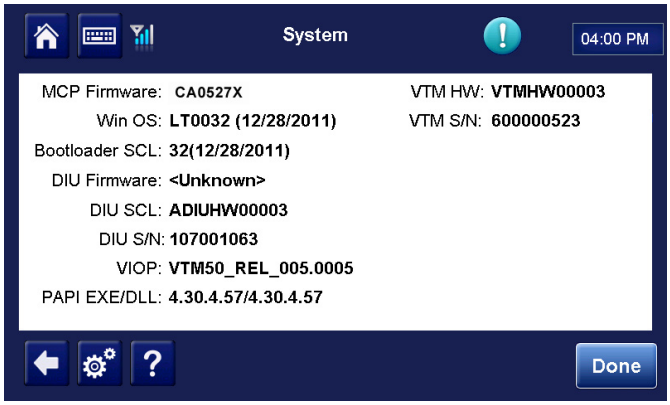
1. Use the right arrow to get to the **System** button. Tap the **System** button.





2. Tap the **System** tab to bring up the System Screen. Tap the **Version** button at the bottom right to access system information about the MCP50.
   - MCP firmware and VIOP version numbers are listed here.





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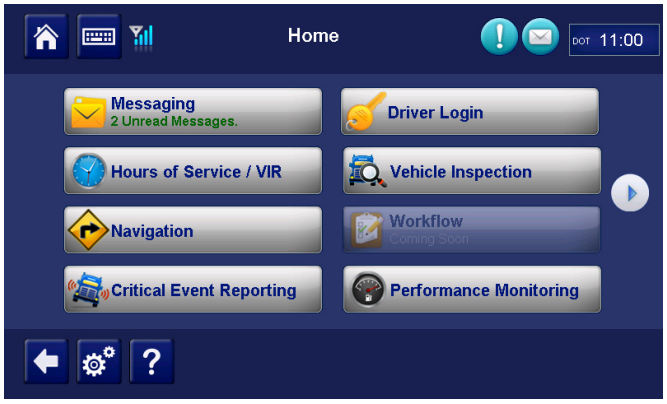
Upgrading Only the MAS50 Software

1. Make sure the MAS50 is powered ON, ignition ON.



2. Insert MAS50 Software memory stick into the USB port on the right side of the DIU.

- The upgrade process takes approximately ten minutes. The screen will run through various images as it is upgrading. You may see a listing of components, various upgrade screens, a dark or fading screen, unit rebooting, acquiring network, network loading, and others. Be patient. It may appear that nothing is happening, but it the upgrade is going on in the background.

3. After the upgrade finishes, the DIU50 screen will show the Driver Warning screen. Tap **OK**.

Driver Warning
03:11 PM
WARNING
Use of this device must not divert your attention away from the road and traffic. Driving while distracted can lead to a serious accident. Keep your eyes on the road.
Ok

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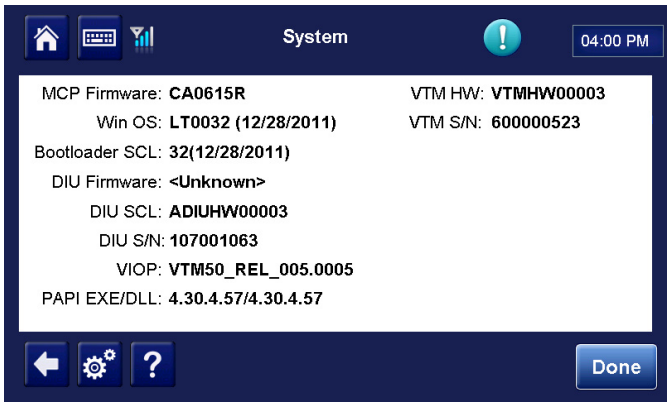
4. Remove the memory stick.

5. Confirm the upgrade is complete by checking that it shows **SyncComplete** on the System screen and the MCP50 software version on the Version screen. Also verify that the VIOP is the latest revision (refer to the *MAS50 External Release Notes*).



Note

For version CA0529R and older, it will not automatically upgrade the VTM VIOP code. Verify if it is correct. If not, call Customer Support.

6. If the display shows only a blinking cursor in the top left, the USB memory stick most likely has a separate boot sector. Remove the USB memory stick, disconnect power until all of the VTM lights are out, and then power up again. The unit will upgrade normally.

7. Perform system verification.

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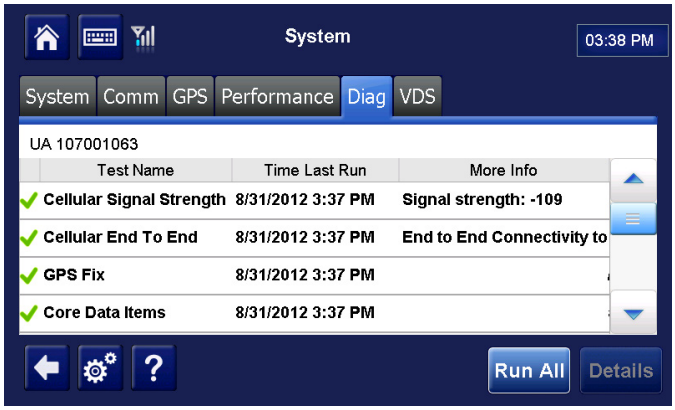
F
Preventive Maintenance Inspection

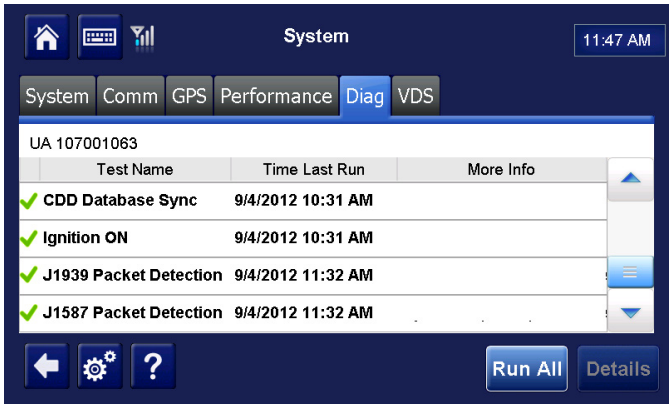
How Often Should Inspections Be Performed?

- Qualcomm recommends inspections be performed at least **once every 90 days.**
- During normally scheduled vehicle preventive maintenance inspections.

Performing System Verification

- Verify proper DIU50 operation. From the Home screen, tap the **Diag** tab. Tap **Run All** button.
- Verify at a minimum that Cellular End To End, Cellular Signal Strength, CDD Database Sync, GPS Fix, and Core Data Items show green check marks.





Inspecting the Vehicle Telematics Module 50 (VTM50)

- Make sure equipment is not stored on top of the VTM50.
- Make sure the VTM50 is in place and does not vibrate.
- Make sure the cables coming into the compartment have enough slack and are not pulling on the VTM50 connectors. Make sure the cables are not being chafed or cut by sharp edges.
- Make sure the cable connectors have not worked themselves loose from the VTM50. Hand tighten any loose connectors.
- Check to make sure the cables are stored securely with tie wraps and are stored out of the way.
- Make sure there is no corrosion around the ground connection. If there is corrosion, take the connection apart, clean the connector and surface with a wire brush, and reconnect the parts.

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Inspecting the Display Interface Unit 50 (DIU50)

- Verify the DIU50 screen is clean.

  Qualcomm recommends that you use a soft cloth and either plain water, glass cleaner, or mild soap to gently clean the surfaces of the DIU50 as well as the display screen.

Caution

The DIU is not watertight. Do not spray any liquid directly on the display screen.

Heavily soiled DIU50s should be returned to Qualcomm using the RMA process for proper cleaning.

Note

Use the PDA stylus, provided with the unit, or your fingers to navigate the DIU50.

Do not use pencils, pens, metal objects, or any other devices which could possibly scratch the touchscreen.

- Make sure the display cable is not a tripping hazard.
- Verify the display screen is readable in any lighting condition.
- Make sure the display cable has enough slack and is not being rubbed or cut by anything inside the cab.
- Remove the DIU50 from the holster and make sure the screws holding the holster in place are secure.

Note

Display cable must not be removed from the DIU50 or warranty will be voided.

Inspecting the Antenna

- Make sure the antenna is securely fitted to the truck.
- Check that the antenna cable connectors have not worked themselves loose from the VTM50 and are not damaged.

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MCP50 System Component MCNs Referenced in this Guide

System component	Illustration	Latest MCN	Alternate MCNs	Notes
Display interface unit 50 (DIU50)		CV90-JB425-100		
Antenna Kit		65-JB514-2		
Vehicle Telematics Module 50 (VTM50)		CV90-JB424-100		
Display interface unit (DIU50) holster		CV90-JB425-710		

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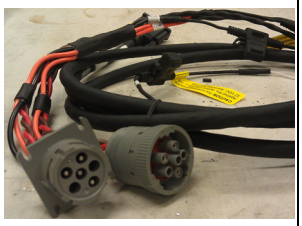
System component	***Illustration***	***Latest MCN***	***Alternate MCNs***	***Notes***
DIU Mounting Kit with Nut plate, RAM mount		65-JB313-1		
Backing plate/ Nut plate only		50-JB290-1		
DIU Mounting Kit: bracket, RAM mount		50-J9978-1		Specifically for Freightliner Columbia or Century
Power/IO cable 6-pin		364-53967-0002		
Power/IO cable 9-pin		364-53967-0003		

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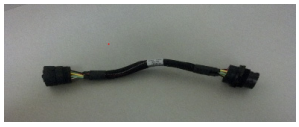
System component	***Illustration***	***Latest MCN***	***Alternate MCNs***	***Notes***
Paccar adapter cable		45-JB593-1		

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QUALCOMM Enterprise Services

Installation Work Order Details (MCP50)

Company Name: _____ **Installation Date:** _____

Company Contact: _____ **Company Phone:** _____

Invoice #: _____**Purchase Order #:** _____**VIN (optional)** _____

Driver Name: _____ **Truck #:** _____ **Mo/Yr:** _____ **MFG/Model:** _____

Technician #1: _____ **Technician #2:** _____

Unit Address (DIU S/N): _____**Ver. Code**_____ **VTM S/N:** _____**Ver. Code**_____

Antenna Mounting Location: _____

VTM Mounting Location: _____

Diagnostic connector: 6-PIN_____ 9-PIN_____ **MCP Firmware:** _____ **Win OS:** _____

PTO Required: Yes___ No___ **PTO Signal:** *Active High*_____ *Active Low (relay required)* _____

Did you call the Hotline for troubleshooting assistance? Yes___ No___ **Case ID and Name:** _____

Metrics: DIAG tab: RUN ALL

Put ✔ or X	Test Name	More Info
	Cellular Signal Strength	Signal Strength;_____
	Cellular End to End	Pass or Fail
	CDD Database Sync	
	GPS (From GPS tab)	Mode:_____ Precision:_____ Satellites:_____ / _____
	J1587 Packet Detection	
	J1939 Packet Detection	
	Ignition ON	If green, toggle Ignition OFF and retest to verify you get red X
	Core Data Items (If not GRN, X items to the right using DETAILS Tab)	____Speed ____Distance LTD ____Fuel LTD ____EngineTime ____RPM

Brightness and Text to Speech Verification:

Brightness responds to adjustments? Yes___ No___ TTS volume control works? Yes___ No___

Message Verification (send test message with truck number): Queued___ Acknowledged___

Parts Missing at Install:

Product ID	Description

I find the service rendered and materials installed in connection with the above mentioned work to have been completed in a satisfactory manner.

Driver/Customer Signature: _____ Date: _____

MAY CONTAIN U.S. AND INTERNATIONAL EXPORT CONTROLLED INFORMATION

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